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The Province of

NEW BRUNSWICK

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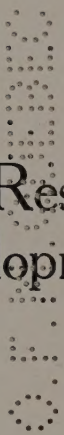

Its Natural Resources and Development

By

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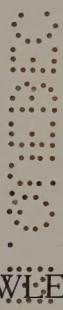

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THE province of New Brunswick, long denied the intensive development of its own bountiful resources on account of the lure of other worlds to conquer—the New England states in early days, Western Canada and industrial Ontario and Quebec in recent times—, is entering a new phase of its history. A realization of its potentialities has come to pass. Its one-time citizens are returning, emigrants from European shores no longer pass it by to seek remoter lands. This incoming population it is hoped will pave the way for an industrial activity very much greater than has heretofore been attained in this maritime country.

Deer at a Salt-spring on the Tobique River

New Brunswick

Its Natural Resources and Development

HISTORICAL INTRODUCTION

WASHED on three sides by Atlantic waves, square-shaped New Brunswick, largest of the eastern Maritime Provinces, holds within and on its lands a wealth which, when developed by a population far exceeding that of today, should enable it to acquire in industrial activity a fame equal to that accorded its Restigouche river by salmon fishers. But before dealing in detail with the agricultural and other phases of this wealth a brief survey will be given of the history, population, and climate of the province, treating incidentally of the main topographical features under the various headings where they rightly belong.

In 1534 when Jacques Cartier first sighted its shores and landed somewhere near point Escuminac, 35 miles from Chatham, began the authentic history of New Brunswick, but it was not until 1604 that the coast was carefully explored. On the 24th day of June in that year Samuel de Champlain and de Monts discovered, to quote from Champlain's narrative, "one of the largest and deepest rivers that I had yet seen, which I called the river St. John because it was on that day that I arrived there", and during the following winter lived with eighty companions on Dochet island at the mouth of the St. Croix. Here was issued a series of papers—the forerunner of all the journals of this continent —under the title *Maitre Guillaume*, "in order that the spirits might be sustained by sundry pleasantries".

During the next forty years numerous expeditions came out to Eastern Canada, among which were those of Sir William Alexander (1621), Claude and Charles La Tour, d'Aunay de Charnisay, Nicolas Denys and Villebon, and it was in this period occurred that famous episode of the intrepid defence by the wife of Charles la Tour of their fort, which stood where now is Fort Frederick, West Saint John.

Throughout the 17th century contests for this territory between the English and French were frequent, until in 1710 the former were victorious and three years later obtained Acadia by the treaty of Utrecht. Afterwards, disputations arose as to whether the territory that is now New Brunswick was part of Acadia or not. Finally in 1756 an expedition under General Moncton cleared the St. John river, and five years later the Tantramar marsh lands about Sackville, which had been tilled by the French, were colonized by English settlers from Connecticut and Massachusetts. In 1762 the settlements of Maugerville, Sheffield and Gagetown were established, all newcomers being from New England. This movement rapidly extended. Settlements by Scotch and English at Bathurst and other points along the Gulf coast were started about 1764, and in the following year the territory became the county of Sunbury in the province of Nova Scotia and was accorded representation in the House of Assembly at Halifax.

Shortly afterwards the American revolution broke out, during which the settlement at the mouth of the St. John was loyal. The province remained a British colony, and when in each of the United States edicts of banishment and laws of confiscation were passed against the persons and property of those who had remained faithful to the British Government during the war, these loyalists, of whom there were about 70,000, came chiefly to Canada. On May 18, 1783, twenty vessels disembarked nearly 3,000 people at West Saint John, at the foot of the street fittingly called "King". The following year saw over 9,000 loyalists in Saint John, and that portion of Nova Scotia north of the Missaguash became a new province under the name of New Brunswick with Fredericton as the capital.

The Napoleonic wars and that of 1812 with the United States retarded the progress of the province and harassed its shipping. In these days the St. John river played an important part as a military route to Quebec by way of the Madawaska river, lake Temiscouata and Rivière du Loup. In 1812 the 104th New Brunswick regiment marched to Quebec on snowshoes in the depth of winter. The distance of 435 miles between Saint John and Quebec was accomplished in 16 days, or an average of 27 miles a day, without the loss of a man; in 1837 this feat was repeated in almost the same time by the 43rd Light Infantry.

The first steamboat to run on the St. John was the *General Smyth*, which inaugurated a service in 1816 between Saint John and Fredericton. The *Saint John* was the first steam craft to cross the bay of Fundy, anchoring in Digby harbour in 1827 amid great excitement. Two years prior to this several disastrous fires had occurred, the worst, on the Miramichi, destroying tremendous areas of forest land and causing the loss of 160 lives.

Historic Landmark—Cathedral at Fredericton, built 1845-53

The progress of the province in the next forty years was steady and permanent. The principal questions of general interest were concerning the boundary line between New Brunswick and the state of Maine, responsible government, and the reciprocity treaty with the United States. The boundary line was one of the questions not finally disposed of at the treaties of Versailles and Ghent, and as regards New Brunswick and the state of Maine there were continuous disputes and strife. In 1839 there was probability of war between the disputants, and military preparations were made by both sides, but negotiations were renewed which eventuated in the Ashburton treaty of 1847 and the establishment of the boundary as it is at present.

POPULATION AND EDUCATION

POPULATION

THE only reliable figures of population are obtained from the Dominion census, and the following table gives those for 1871 and subsequent census years, also the percentage rate of increase by decades:—

Year	Population	Decade	Per cent increase
1871	285,594	1871–1881	12·48
1881	321,233	1881–1891	0·01
1891	321,263	1891–1901	3·07
1901	331,120	1901–1911	6·27
1911	351,889	1911–1921	10·23
1921	387,876		

According to the estimates mathematically computed by the Dominion Bureau of Statistics, the population of the province on June 1, 1929, was 419,300, indicating an increase of 8·10 per cent since 1921.

AREA AND POPULATION BY DISTRICTS

District	Land area square miles	Population	
		Total	Per square mile
Whole province	27,985	387,876	13·8
Charlotte	1,283	21,435	16·7
Gloucester	1,870	38,684	20·6
Kent	1,779	23,916	13·4
Northumberland	4,749	33,985	7·1
Restigouche and Madawaska	4,546	42,977	9·4
Kings and Queens	2,856	32,078	11·2
St. John and Albert	1,303	69,093	53·0
Victoria and Carleton	3,403	33,900	9·9
Westmorland	1,444	53,387	36·9
York and Sunbury	4,694	38,421	8·1

ORIGINS OF THE PEOPLE

In 1921 the rural population numbered 263,432, the urban 124,444, the dwellings 70,428. From the following table which gives the racial origin and distribution, by

counties, of the population, it will be seen that the British and French predominate, the latter constituting about one-third of the total. The majority of the French are descendants of the original French colonists or Acadians and, like their forefathers, engage in some phase of the fishing industry or of agriculture, exhibiting a preference for those counties bordering the St. Lawrence gulf, particularly Gloucester, Westmorland, and Kent. In Madawaska and Restigouche are many French Canadians from the adjoining Quebec province. The English-speaking population is composed of settlers from the British Isles and largely of descendants of those United Empire Loyalists who came from the United States during the American revolution. Accompanying these Loyalists were many faithful negroes, whose descendants numbered about 1,000 in 1921.

The province does not have to contend with any problems of race assimilation, and the incoming settler is always assured of associations congenial to him.

County	British	French	Dutch	German	Hebrew	Italian	Scandinavian	Syrian	Indian	Negro	Miscellaneous	Total
Albert	7,451	94	652	359	2	1	35	–	5	–	8	8,607
Carleton	20,065	280	348	77	40	18	63	1	81	111	16	21,100
Charlotte	20,502	266	209	110	21	4	216	–	1	12	94	21,435
Gloucester	5,410	33,051	45	25	22	30	11	22	7	–	61	38,684
Kent	5,713	17,983	7	4	–	5	7	5	151	–	41	23,916
Kings	19,337	327	377	149	12	17	69	–	61	11	39	20,399
Madawaska	990	18,915	1	5	10	30	22	61	89	–	15	20,138
Northumberland	24,799	8,264	19	38	59	–	190	73	407	2	134	33,985
Queens	10,612	406	177	77	–	74	46	22	11	132	122	11,679
Restigouche	8,349	14,057	20	25	38	16	166	89	3	4	72	22,839
St. John	54,722	2,397	304	258	865	109	445	238	15	517	616	60,486
Sunbury	5,242	324	221	117	–	6	55	–	75	41	81	6,162
Victoria	8,613	3,125	119	65	20	15	631	5	183	–	24	12,800
Westmorland	31,335	20,866	287	291	86	29	140	26	89	76	162	53,387
York	29,862	756	852	98	68	13	46	52	153	284	75	32,259
Total	253,002	121,111	3,638	1,698	1,243	367	2,142	594	1,331	1,190	1,560	387,876

NATURALIZATION

Any alien desiring naturalization may apply to the court in his district for a certificate, provided that within the preceding eight years he has resided five years in Canada or a British possession, of which the last has been in Canada. Receipt of this certificate entitles him to all the political rights and privileges of a British subject with, of course, the concomitant obligations. The Secretary of State may include in the certificate the names of the

children of the applicant who are minors born abroad but resident in Canada with their parents. If the applicant is a resident of New Brunswick he should apply to the Supreme Court or to the court of the county in which he lives. The clerk will post his application for a specified time and then notify the Secretary of State, who, if satisfied as to the circumstances, will issue the certificate.

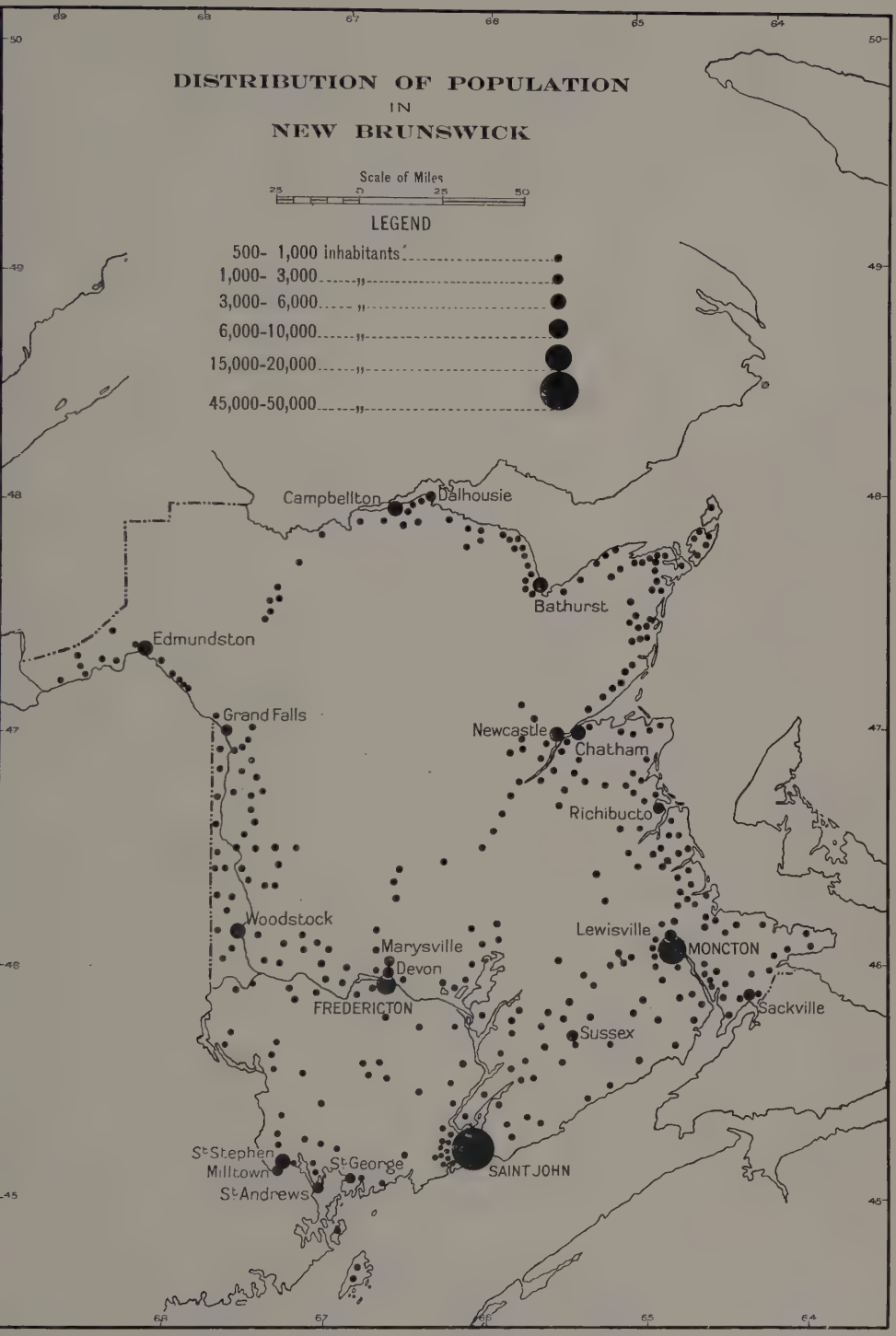
ADMINISTRATION OF JUSTICE

The laws of New Brunswick, like those of all Canadian provinces except Quebec, are founded upon the common law of England. In addition to this law all English statute law down to the restoration of Charles II is considered to have been adopted by the General Assembly of the province at its first session. Much of the later English statute law is also in force because of its re-enactment by the provincial legislature or by the Dominion Parliament.

The latter in 1875 established the Supreme Court of Canada and later the Exchequer Court. The Supreme Court has appellate jurisdiction from all the courts of the provinces, and questions may be referred to it by the Governor General in Council. Its judgment is final in criminal matters. This court also has jurisdiction in cases of controversies between the provinces and the Dominion, and in certain cases between the provinces themselves.

There is an appeal from the Supreme Court in civil cases, under certain limitations, to the Privy Council in England. The Privy Council also entertains appeals direct from the provincial Appeal Courts without the intervention of the Supreme Court of Canada. The decisions of the Privy Council contain most valuable and important declarations of law as to the constitution of Canada and as to the varied powers of the federal and provincial legislature.

The law is administered within New Brunswick by various courts, all of which adjudicate in both civil and criminal matters. The Supreme Court of New Brunswick has jurisdiction over the entire province, and consists of three divisions—a Court of Appeal, a Chancery Division, and a King's Bench Division. The Court of Divorce and Matrimonial Causes has powers similar to those of the Probate and Divorce Division of England, and the grounds for obtaining an absolute divorce are the same.


DISTRIBUTION OF POPULATION
IN
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
500- 1,000 inhabitants
1,000- 3,000 ,,
3,000- 6,000 ,,
6,000-10,000 ,,
15,000-20,000 ,,
45,000-50,000 ,,
Campbellton
Dalhousie
Bathurst
Edmundston
Grand Falls
Newcastle
Chatham
Richibucto
Woodstock
Marysville
Devon
FREDERICTON
Lewisville
MONCTON
Sackville
Sussex
St Stephen
Milltown
St Andrews
St George
SAINT JOHN
69
68
67
66
65
64
50
49
48
47
46
45

The county courts have jurisdiction only over their respective counties, and are limited to actions in which no greater a sum than $400 is involved in matters of contract and $200 in matters of tort. They cannot deal with matters affecting title to land or the validity of bequests under wills. They have criminal jurisdiction in all misdemeanours and in all but the more serious felonies.

Stipendiary magistrates' courts and parish courts have more limited powers. Finally come Justices of the Peace, whose jurisdiction extends only to $20 in contract and $8 in tort.

There is no central probate registry in the province, but each county has a separate and distinct probate district with its own resident judge and registrar. These judges have full power to grant probates of wills either in common or solemn form and also to issue letters of administration to the effects of intestates, the right to appeal from their decision to the Court of Appeal being permissible.

EDUCATION

Elementary and secondary education throughout New Brunswick in so far as it is publicly controlled is carried on in free, non-sectarian schools, the annual expenditure in connection with which now amounts to greater than $3,000,000, which is provided for from government grants, municipal funds, and local assessments. In the elementary schools the curriculum of what is known as Grades I to VIII is taught, whilst in the secondary schools are pupils of the higher grades IX to XII. An average pupil will complete one grade in each school year and should therefore finish his secondary school course at the age of eighteen.

The majority of pupils in advance of Grade VIII are taught in secondary schools known as grammar schools (similar to high schools in other provinces), which are free to all qualified pupils in the country. Most of the remainder are taught in so-called superior schools, free to all pupils in Grade VII and upwards in the parish where the school is situated. The normal school for the training of teachers is an academic institution, pupils being admitted directly from the elementary grades of rural (ungraded) schools and given their high school training (*i.e.*, in work usually above Grade VIII) in the normal school itself.

The present status of education, which is administered by a department linked with the provincial Government not through a minister of the Crown as in most other provinces but through a council representing members of the Government, is very satisfactory. A recent progressive step has been the providing of free text books to public school pupils in the first eight grades, a provision which heretofore only applied to those in the primary grades. Greater attention is being given to the question of more adequate school privileges to pupils in poor and remote

Vocational School at Woodstock

districts, schools actually being maintained where the attendance in some cases is less than half a dozen pupils; arrangements, too, are sometimes made for the conveyance and boarding of pupils.

Statistics covering the school year ending June 30, 1928, show the highest recorded attendance at the public schools—the number of different pupils being 81,955, or nearly 2,000 greater than in 1926-27—, also a greater expenditure than in any previous year for school buildings and equipment.

The province has 161 graded schools (*i.e.*, schools with more than one class room or teacher) with 41,273 pupils; 1,293 ungraded schools with 35,430 pupils; 4 private elementary and secondary schools with 659 pupils; 3 business colleges with an attendance of 328; 1 normal school, the attendance at which is limited by its capacity to about 300 students who are admitted on a selective basis; 1 institution having an enrolment of 72 teachers in training for vocational work; and 3 universities. In addition day technical classes are conducted in 8, and evening technical classes also in 8, municipalities, the combined day and evening attendance being about 3,000.

Main Building of the University of New Brunswick

The three universities include one which is state controlled—the University of New Brunswick founded at Fredericton in 1800—and two denominational, namely, the University of St. Joseph's College founded at St. Joseph in 1864, representing the Roman Catholic Church, and Mount Allison University founded at Sackville in 1858, representing the United Church of Canada. In the academic year ended June 30, 1928, the numbers of registered

students were 269 (213 men, 56 women), 364 (all men), and 483 (274 men, 209 women) respectively; a large proportion of the students at Mount Allison University is drawn from Nova Scotia.

The University of New Brunswick is affiliated to Oxford, Cambridge, Dublin, and McGill Universities; Mount Allison to Dalhousie, Oxford and Cambridge, and St. Joseph's to Oxford. The first named has faculties in arts, applied science, forestry, and law, the second in arts, theology, engineering, and St. Joseph's in arts and science.

CLIMATE[1]

NEW BRUNSWICK has a climate which in many respects is comparable with that of southern Ontario. The summers are not quite as warm, but warmer than in the south of England; and although spring opens a little later temperatures in October fall less rapidly.

At Fredericton the mean temperature of the coldest month is 13°, whilst at Grand Falls, Williamsburg in York county, and Dalhousie, places further north, it is 9°. The comparative cold of the winters in a region lying between north latitudes of 45° and 48° and having such an extensive coast line is due to westerly and northwesterly winds which drive the frigid air of northern Quebec over the province.

The following tables summarize meteorological records of many years at a number of representative points in New Brunswick. The highest and lowest temperatures in each 24 hours are termed respectively the maximum and the minimum. For any month the sum of the daily maxima, divided by the number of days in the month, is the mean maximum temperature of that month; the mean minimum temperature is similarly derived. The half sum of the mean maximum and the mean minimum is called the mean temperature. The averages of these results for any particular month over a period of years give respectively the mean maximum, mean minimum, and mean temperatures shown in the tables. All temperatures are expressed in degrees Fahrenheit, those below zero having the minus sign (−) prefixed. The term "precipitation" is used to include rain, snow, hail, sleet, etc., precipitated from the atmosphere upon the earth. The total depth of snow is shown separately, but is included with rain, etc., in the columns under "total precipitation in inches", 10 inches of snow being taken as the equivalent of 1 inch of rain.

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[1] Much of the information in this section has been prepared by the Meteorological Service, Toronto.

TEMPERATURE AND PRECIPITATION

ST. JOHN (OBSERVATIONS FOR FIFTY YEARS)

—	Temperature					Total precipitation in inches				Snow in inches	
	Mean	Mean maximum	Mean minimum	Extreme maximum	Extreme minimum	Average monthly fall	Maximum amount in one month	Total amount in driest year	Total amount in wettest year	Average monthly fall	Maximum amount in one month
January	19	28	10	53	−21	4·4	10·7	3·3	4·8	20	43
February	20	28	12	50	−19	3·7	7·9	2·4	7·7	20	52
March	28	36	21	58	−10	4·3	10·5	4·7	5·9	15	37
April	39	46	31	75	6	3·2	7·4	1·3	2·9	7	26
May	48	56	41	87	26	3·6	10·0	0·4	3·7	Light	5
June	56	64	49	87	35	3·2	6·9	3·2	4·8	–	–
July	61	68	54	89	41	3·4	7·8	2·6	4·5	–	–
August	61	68	54	89	42	3·8	10·4	3·2	3·3	–	–
September	56	63	49	87	32	3·6	7·7	5·3	3·4	–	–
October	47	54	40	75	21	4·1	10·2	1·1	8·3	Light	4
November	36	42	30	62	− 9	4·5	9·8	4·8	7·2	6	23
December	24	32	16	54	−20	4·2	7·4	2·9	3·0	14	40
Year	41	49	34	89	−21	46·0	–	35·2	59·5	82	–

GRAND MANAN (OBSERVATIONS FOR TWENTY YEARS)

January	23	30	15	52	−23	4·9	8·3	3·0	7·7	18	35
February	23	31	16	49	−12	3·8	7·0	1·9	7·0	22	37
March	31	37	24	55	−11	5·0	12·0	2·7	5·5	13	24
April	40	47	33	73	13	3·3	6·0	4·1	3·1	4	16
May	48	56	41	84	28	4·1	7·8	2·3	6·9	–	–
June	56	64	48	86	37	3·0	5·2	3·9	3·6	–	–
July	62	70	54	89	40	2·7	5·8	1·2	0·7	–	–
August	61	69	54	90	44	3·6	6·2	1·9	2·7	–	–
September	55	63	47	89	34	3·4	6·7	2·9	3·0	–	–
October	48	54	42	79	25	4·6	12·6	2·9	12·6	Light	2
November	39	45	32	65	2	5·4	12·3	5·1	6·8	4	17
December	28	35	20	57	−14	4·4	7·8	3·4	3·1	15	39
Year	43	50	36	90	−23	48·2	–	35·3	62·7	76	–

FREDERICTON (OBSERVATIONS FOR FIFTY-FIVE YEARS)

January	13	23	2	55	−35	3·9	8·3	6·6	3·0	24	59
February	15	26	3	53	−35	3·2	6·1	2·8	2·6	23	41
March	26	36	16	65	−27	3·6	7·6	1·1	4·7	17	34
April	39	49	28	83	− 5	2·8	4·9	1·2	3·1	7	25
May	51	62	39	92	24	3·1	9·1	1·9	2·6	Light	3
June	60	72	48	96	27	3·7	8·1	2·4	7·6	–	–
July	66	77	55	96	38	3·5	7·8	1·8	4·9	–	–
August	64	75	53	95	32	3·9	8·8	1·6	5·7	–	–
September	56	67	45	92	23	3·6	11·0	5·3	4·1	–	–
October	45	55	36	82	13	4·0	10·6	0·9	7·1	Light	3
November	32	40	24	68	−16	3·9	6·5	3·6	4·6	8	26
December	19	28	10	58	−31	3·4	6·5	3·9	4·7	18	52
Year	41	51	30	96	−35	42·6	–	33·1	54·7	97	–

CHATHAM (OBSERVATIONS FOR FIFTY YEARS)

January	13	22	3	52	−38	3·5	6·8	4·1	4·8	26	62
February	14	25	2	51	−39	2·8	5·4	0·4	2·6	23	44
March	24	35	14	67	−26	3·4	8·1	2·9	4·5	19	37
April	37	47	28	85	− 4	3·0	6·4	2·7	4·4	12	31
May	49	60	39	92	24	3·2	6·9	1·8	2·4	1	10
June	60	71	48	96	30	3·5	6·8	1·0	3·0	–	–
July	66	77	56	98	40	4·0	9·6	3·2	4·4	–	–
August	64	75	54	100	38	4·0	7·5	2·5	4·8	–	–
September	56	67	46	91	25	3·1	8·3	1·9	8·3	Flurry	1
October	45	54	36	83	14	3·9	9·2	2·9	6·2	1	8
November	32	39	25	66	− 8	3·6	6·8	4·4	4·2	11	35
December	19	27	11	58	−29	3·3	7·1	3·1	3·9	21	60
Year	40	50	30	100	−39	41·3	–	30·8	53·5	114	–

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The following tables are based upon records available only for shorter periods than those used in compiling above tables:—

AVERAGE MONTHLY PRECIPITATION IN INCHES

—	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Bathurst	3·0	2·7	2·5	1·7	2·4	2·5	3·4	3·2	2·6	3·1	2·4	2·6	32·1
Grand Falls	2·9	2·6	2·4	3·2	2·5	3·9	4·1	2·6	2·8	3·0	2·5	2·2	34·7
Williamsburg	3·7	3·2	3·0	3·3	2·6	3·5	3·9	3·0	3·2	4·0	3·5	3·8	40·7
Dalhousie	2·0	2·8	2·9	1·8	2·4	3·0	3·3	3·3	2·9	3·0	2·9	2·8	33·1
Woodstock	3·6	3·1	3·3	2·8	2·7	4·3	4·1	3·2	3·3	3·6	2·7	2·8	39·5
Pt. Escuminac	2·6	2·4	2·1	1·7	2·0	2·2	2·9	2·8	2·3	3·0	2·6	2·0	28·6
McAdam	3·8	3·1	3·1	3·1	2·6	3·0	3·2	4·1	3·9	4·6	4·1	3·1	41·7
Edmundston	2·7	2·2	1·8	2·4	3·0	3·5	4·3	3·0	3·5	2·3	3·3	2·2	34·2
Sussex	4·3	3·5	4·3	3·4	2·8	3·0	3·0	3·0	3·0	3·9	3·8	3·6	41·6

AVERAGE MONTHLY SNOWFALL IN INCHES

Bathurst	25	26	18	6	1	–	–	–	Light	1	9	20	106
Grand Falls	21	24	16	11	Light	–	–	–	–	1	11	18	102
Williamsburg	29	26	17	6	2	–	–	–	Light	Light	14	22	116
Dalhousie	23	25	16	8	Light	[1]	–	–	–	Light	11	21	104
Woodstock	24	24	19	7	1	–	–	–	–	1	7	17	100
Pt. Escuminac	19	21	15	9	Light	–	–	–	–	Light	4	13	81
McAdam	27	25	12	5	–	–	–	–	–	1	7	19	96
Edmundston	24	18	14	9	Light	–	–	–	Light	2	10	19	96
Sussex	17	22	11	5	1	–	–	–	–	Light	7	15	78

[1] A little snow has been noted in June in some years.

MEAN TEMPERATURE

Grand Falls	9	10	23	36	50	59	66	60	53	41	32	15	38
Williamsburg	9	10	23	38	48	58	65	62	53	44	29	17	38
Dalhousie	9	11	22	33	46	57	63	61	54	42	30	16	37
Woodstock	9	12	23	36	50	60	66	64	56	46	32	17	39
McAdam	9	11	24	37	49	58	66	60	54	43	30	15	38
Edmundston	7	9	22	36	47	59	64	63	54	43	30	16	37
Sussex	15	16	27	40	50	59	65	63	55	45	34	19	41

MEAN MAXIMUM TEMPERATURE

Grand Falls	21	20	34	46	61	69	76	73	63	52	39	22	48
Edmundston	19	21	34	47	60	72	77	76	67	54	38	24	49
Williamsburg	18	22	33	48	59	70	76	74	64	55	37	26	49
Woodstock	20	24	34	47	60	72	77	75	68	56	40	26	50
McAdam	22	25	36	47	61	71	76	73	66	55	40	27	50

MEAN MINIMUM TEMPERATURE

Grand Falls	−4	−1	11	26	39	48	56	47	43	29	24	7	27
Edmundston	−5	−3	9	25	35	46	52	49	41	32	21	8	26
Williamsburg	0	−2	12	25	35	46	54	51	42	33	21	8	27
Woodstock	−3	0	13	26	39	48	56	54	44	36	24	8	29
McAdam	−4	−2	12	26	35	45	55	48	42	32	20	4	26

AVERAGE MONTHLY BRIGHT SUNSHINE (IN HOURS)

Fredericton	112	127	150	176	209	219	233	219	176	150	93	95	1,959
St. John	119	126	154	151	209	198	195	191	172	151	104	100	1,870

AVERAGE MONTHLY RELATIVE HUMIDITY (PER CENT OF SATURATION)

Chatham	75	75	78	79	76	75	78	80	80	80	79	75	78
Fredericton	83	82	80	73	70	71	80	82	85	84	86	86	80
St. John	79	78	76	76	78	80	85	84	83	81	81	80	80

THE BAY OF FUNDY REGION

It will be seen from the above tables for Saint John and Grand Manan that the average temperature during December, January and February along the coast of Fundy bay, which has a milder winter than any other part of New Brunswick, is 20° to 25°. During the afternoon the thermometer generally rises near to or above the freezing point and days are fairly common when it exceeds 40° though rare when it reaches 50° or greater. The lowest temperature in every 24 hours during these months will average 10° to 15°, but cold waves may bring the minimum temperature to zero and on especially cold occasions, which seldom occur, to 10° to 20° below zero.

The winters vary widely from year to year, some months being as much as 8° or 9° warmer or colder than usual. March, when winter usually ends, has an average daily minimum temperature of 20° to 25° and a daily maximum that generally exceeds 35° by the middle of the month and 40° in the last week. The warmest March on record was 15° warmer than the coldest.

The gain in mean temperature from February to June is about 8° per month, the mean minimum in the latter month being about 50° and the mean maximum 65°. Warm periods have occurred shortly after the middle of April when the thermometer rose to 75° to 85°, and yet on the other hand a cold wave may make the temperature in the early part of this same month fall to 10° or 15°, but this is most unusual.

In both July and August the mean temperature averages 60° to 62° (55° in the early morning, rising to 70° in the afternoon), the thermometer often attaining 80° to 90°, although it may fall on very rare occasions to near 40°. June, July, and August vary in temperature much less than does the winter period, a summer month 4° warmer or colder than the normal being exceptional.

September is generally 5° or 6° cooler than August on the average, the difference being largely accounted for by the rapid fall in temperature towards the end of the month, for the early part is usually warm and occasionally hot. Although frost seldom occurs in late September, it may in October which is 8° cooler than September, November showing a further drop of 10° and having an average daily minimum temperature near the freezing point. An ex-

ceptionally cold wave, however, may on rare occasions bring the temperature near to or below zero before November ends.

The annual total precipitation amounts to between 45 and 50 inches, of which about 8 inches is due to the water equivalent of snow. About 5 inches of snow falls in November and in April, 15 inches in December and in March, 20 in January and in February. In a single month the precipitation may exceed 10 inches or be only half an inch, but such figures are uncommon. Snow may fall to the amount of 40 to 50 inches a month during an abnormal period, but its accumulation to any great depth on the ground is usually prevented by the frequent returns to the mild rainy weather characteristic of the winter months.

The hours of bright sunshine per month generally exceed 100 in winter, 150 in spring and fall, and are about 200 in summer.

Humidity averages about 75 per cent of saturation in March and April, in which months it is least, and about 85 per cent in July and August. The usual range of humidity is from 35 to 100 per cent in a winter month and from 40 to 100 per cent in summer.

In the Fundy bay region the prevailing winds are northwest in winter and southwest in summer; gales are rare from June to September; and fogs, which may occur in any month, are slightly more frequent in September and October.

INTERIOR AND NORTHERN NEW BRUNSWICK

The winters are colder as one goes north from the bay of Fundy. At Fredericton in the southern interior and at Chatham on the coast the temperatures average about 5° colder in winter than at Saint John and 10° colder than on Grand Manan island. Further north still there is another fall of about 5°, January averaging less than 10° above zero on the elevated plateau of the interior, on Chaleur bay, and along the upper boundary of Maine and the boundary of Quebec. As already stated such cold weather results from the northwesterly winds, and though at times southerly and southeasterly winds from the Atlantic prevail and the temperature rises rapidly, occasionally reaching 50° or better, the general atmospheric circulation on the North American continent and over adjacent waters does

not allow much abatement of the general westerly and northwesterly drift except in abnormally mild winters during which the excess over normal temperature may be 7° to 9°. On the other hand, an exceptional increase in the intensity of the northern anticyclones may bring the temperature of a winter month 10° below normal, with occasional days when the thermometer falls to 30° to 40° below zero.

In the summer the interior region is often warmer than the distict adjoining the bay of Fundy; even along Northumberland strait and on the bay of Chaleur the maximum temperature of the day can exceed that recorded at Saint John, temperatures of 90° to 100° being likely to occur at any time between late May and the middle of September. In July and August the northern and eastern coasts generally have slightly warmer nights than on the Fundy coast; the night temperature in the interior, however, falls, except in July, to a lower point than on the coasts, light frosts limited to small areas having sometimes occurred in early June and late August. On the average the lowest daily temperature is 45° to 50° in June, 55° in July. In August the mean daily minimum in the western interior ranges from 47° to as much as 55°, this somewhat large variation being in part explained by the influence of local topography on night temperatures in the latter part of August and in part perhaps by the lack of meteorological records over a sufficiently long period.

In the north and the central interior the snowfall is greater and rainfall less than on the Fundy coast. On the average 7 to 9 feet of snow fall during the year, of which sometimes as much as 3 or 4 feet accumulate on the ground by the end of January or February. Exceptionally open winters have however occurred.

In the elevated regions the slopes facing the moisture-bearing winds from the east and south receive more rain and snow than those exposed to the westerly and northwesterly winds, in fact a greater amount than points on the north coast, the average annual precipitation exceeding 40 inches in some places and ranging from less than 30 to 35 inches in the drier regions.

In the interior the humidity is slightly less and the number of hours of bright sunshine slightly greater than on the coasts.

FARM LANDS AND FARMING[1]

THE concerted governmental efforts that are being made to increase settlement in order that New Brunswick's farm lands may realize the wealth to which their extent and fertility entitle them are fructifying, as is evident from the rapid progress of recent years in a number of lines of agricultural activity.

The necessity for this increased settlement has arisen because the remarkable growth of the nearby New England States in the latter part of the nineteenth century, and the lure of the Prairie Provinces since 1900, together with the industrialization of Ontario and Quebec to meet the demands of western settlers, deprived the province of its young people to such an extent that the supply of labour there became seriously depleted and the establishment of new industries greatly handicapped. Emigration induced further emigration, and agriculture retrograded with increase in lumbering and fishing which provided an easier living under the circumstances. Furthermore, because agricultural enterprise has been conducted generally in small units rather than in large it has been at a disadvantage, perhaps, in withstanding periodical depressions in trade and business.

This explains why farms of from 75 to 200 acres can often be cheaply obtained, having from 20 to 100 acres cleared and ready for cropping, an abundance of firewood, and frequently a fair amount of good timber. Some of these farms have small orchards sufficient to provide all the apples and other fruits needed for family use. The buildings are generally adequate, in some cases needing repair, but usually ready for occupancy and worth as much at least as the entire cost of the property. And although the soil may be slightly impoverished through neglect the farms are so cheap that the new settler can afford to buy during the first year hay and fertilizer with which to sustain his live stock and to produce his crops.

In recent years, however, the tide of western migration has been ebbing, and recognition which is rightly merited is at length being given to the agricultural opportunities the province offers in the development of the many thou-

[1] Revised by Department of Agriculture, Fredericton.

sands of acres of fertile Crown land which await the settler and which can be obtained free in some districts and by a small payment in others.

HOW FARM LANDS CAN BE SECURED

Under the Labour Act a prospective settler has the privilege of securing without cost a lot of 100 acres in any Crown settlement area other than the Blue Bell tract, provided that within 3 years he clears 2 acres and builds a house 16 by 20 feet. At least 10 acres must be cleared and cultivated before he can receive title to his land.

Rural Scene Near Fredericton

No area is thrown open for settlement unless it is well served by roads and is adaptable to farming. In the counties of Victoria, Restigouche, Gloucester, Northumberland, and Madawaska are to be found many of the newer settlement areas, but a few scattered lots are still available in the older and more settled counties such as Westmorland and Queens. In 1928 new settlers took up 161 lots, 18 being in the Blue Bell area and 85 in other parts of the province, particularly in the thriving and largely French Canadian settlements of Hazen, Grimmer, and Stewart, along the

railway line between St. Leonard and Campbellton in Restigouche. In that county an additional settlement area, known as Grog Brook, situated on the new trunk highway west of Campbellton, was opened in 1927 and many of the lots surveyed have already been occupied.

In the Blue Bell tract of Victoria county where there is a splendid type of Danish settler a charge of one dollar an acre is made, 25 per cent of which must be paid on application and the balance in 3 annual instalments of $25 each. The conditions to be fulfilled by the settler are somewhat similar to those in force in regard to free lots. The tract has an area of 50,000 acres of rolling upland covered with a fine growth of trees free from underbrush; it has excellent transportation facilities and is well watered by the Tobique river and its tributaries. The soil is a reddish loam with a clay subsoil; twenty-five years ago it was covered with a dense forest of hardwood, intermingled with pine and other softwood trees, now it is producing abundant crops of vegetables and grain. In this area and adjacent to flourishing Danish and Scotch settlements is still available a large number of 100-acre lots of what is probably the best Crown land yet opened to the intending farmer.

PURCHASE OF LANDS THROUGH THE FARM SETTLEMENT BOARD

The prospective settler who has a modicum of capital can purchase a farm on easy terms through the Farm Settlement Board which was created in 1912 by the provincial Government for the benefit primarily of the people of New Brunswick. This board from time to time buys and improves vacant farms which it afterwards resells at cost price. The applicant must pay initially 25 per cent of the purchase price, or 35 per cent if the value of the property is in excess of one thousand dollars, and the balance with interest at 5 per cent at stated periods to be agreed upon by the board and the applicant. Since its inception the board has acquired and sold over 603 farms on 336 of which payments have been completed, the balance being in process of being paid for; in 1928 it purchased 72 vacant farms at a total cost of $93,295.

FARMS FOR BRITISH IMMIGRANTS

The facilities of the board have recently been applied to an effort to settle during each of the next 5 years 100 desirable British families on vacant farms in New Brunswick in concordance with the tripartite agreement which was concluded in 1927 by the provincial, federal, and British Governments and which came into effect on March 1, 1928. Under this agreement the full quota of 100 families was placed in 1928, 94 of which were assigned to farms purchased by the New Brunswick Government, 5 to farms owned by the Dominion Government, and one to work with a New Brunswick farmer. The land settlement branches of the federal Government are also active in promoting farming in New Brunswick, and have satisfactorily placed during the last two years, 1927 and 1928, a total of 108 British families. In addition to these British, 41 Scandinavian families arrived in 1928 settling in Victoria county chiefly.

A British boy who has acquired the necessary farm experience in New Brunswick by working as an agricultural labourer for wages and who has saved $500 can apply for a 20-year loan of $2,500 at 5 per cent to enable him to purchase a farm with stock and equipment. Any British boy is eligible who came to Canada since May 31, 1922, and was between 14 and 20 years of age on his arrival. A recognized centre for the reception and, if necessary, the training of boys entering the province to engage in agriculture has been established at Gagetown in Carleton county.

TYPES OF LANDS

About two-thirds of the province is covered with trees growing in soils for the most part well suited for agriculture, and although undoubtedly much forest land within the central and northerly counties is capable of supporting forest growth only, it contains occasional open stretches of good loamy soil which will be profitably farmed one day.

Of the soils now under or available for cultivation in the more or less settled parts of the province there are three distinctive types, upland, intervale, and marsh land. The upland soils, of which the bulk of the farming lands is comprised, vary from rich alluvial loam, capable of producing large crops of hay, cereals, and vegetables, to the light

sandy soils unfit for cultivation but suitable for pasturing sheep. The uplands adjoin the so-called intervale lands which beautify either side of the rivers, particularly the St. John and its tributaries, and form in places attractive and extensive islands in mid-stream. These intervales, annually enriched as they are by the alluvium deposited by the spring freshets, provide without additional fertilizer large crops of good hay and varied grasses of the finest type for pasturage. Even in the northern and more thickly forested parts of the province similarly rich sections of land are found, notably along rivers in the counties of Northumberland and Kent.

MARSH LANDS

The marsh lands, by which must not be understood bogs or swamps, extend eastward from Saint John along the bay of Fundy and constitute one of the province's most valuable agricultural assets. They have been created by the extraordinary tides in the bay which have scoured out soil in enormous quantity and thrown it up on to the land. Reclaimed by dykes built by the early French settlers they now form an extensive meadow with soil 80 feet deep in some places, the reviving of which if necessary—which indeed must be seldom, for there are lands which have not been treated in any way for 50 years or more still yielding crops as bountiful as ever—is effected by opening the dyke gates. Each year these lands produce an abundance of luxuriant tall grasses, for which purpose they are almost solely used, as root crops do not fare well. The yield of hay is at least 3 tons to the acre and is of excellent quality, but where intelligent draining has not been resorted to only the coarser kinds of grasses are produced. Marsh lands well drained near towns command a price of about $100 an acre, those elsewhere $50 or less. The famed Tantramar marshes situated in Westmorland county southeast of Sackville are 13½ miles long and 4 to 8 miles broad.

EXTENT OF AGRICULTURAL LANDS

The total area of the province is 17,910,400 acres and the estimate of possible farm land 10,718,000 acres, of which 39·8 per cent was occupied at the time of the last census, 1921, compared with 32·3 per cent in 1911. The acreages in 1921 of improved land (by which is meant land which

has been brought under cultivation and is fitted for producing crops; it includes also orchards, gardens, and land occupied by buildings) and of unimproved land in each county were as follows:—

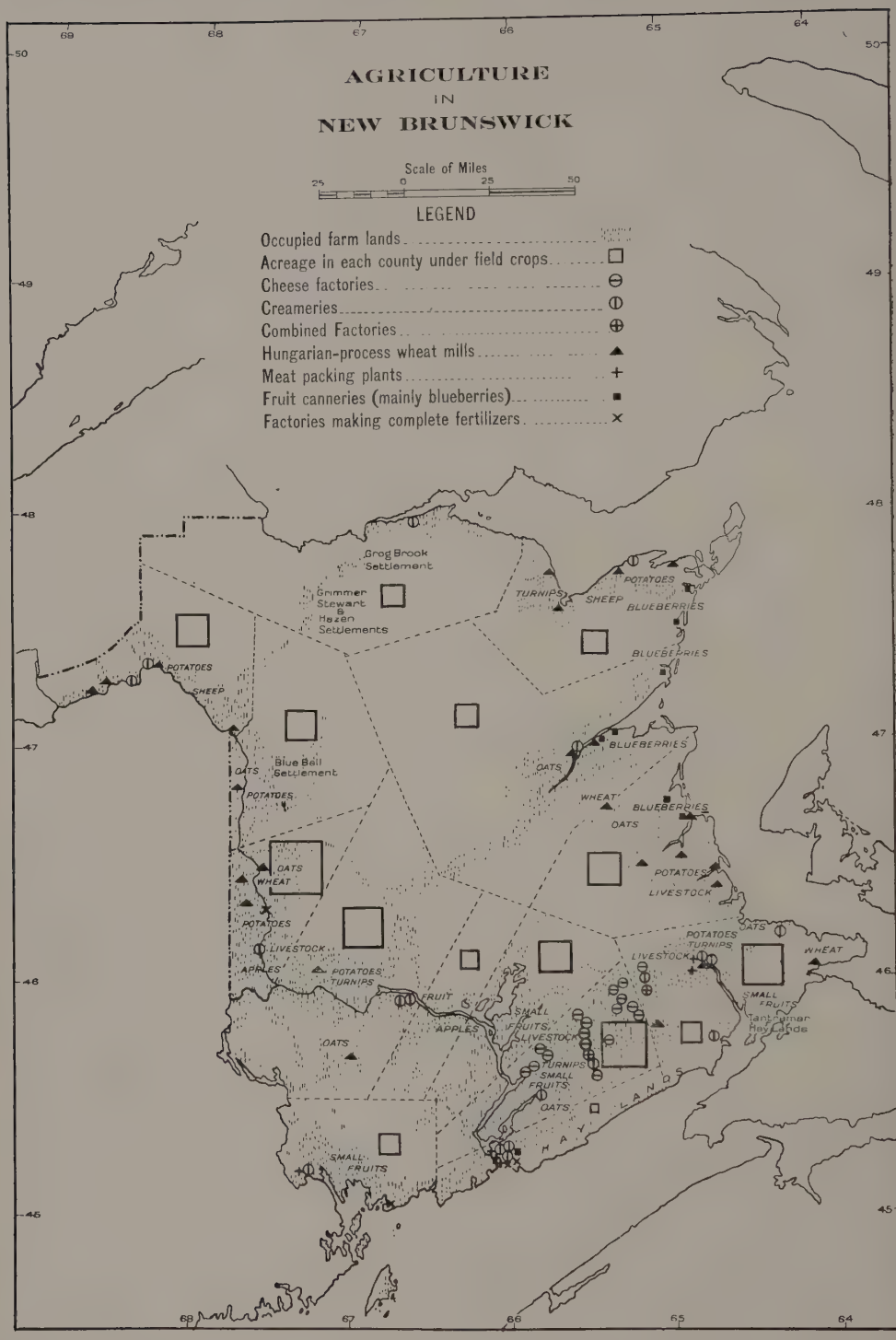
County	Improved land	Unimproved land	Total occupied farm land
Albert	48,203	130,282	178,485
Carleton	224,146	192,355	416,501
Charlotte	35,728	178,017	213,745
Gloucester	84,144	229,868	314,012
Kent	112,289	208,912	321,201
Kings	158,152	317,274	475,426
Madawaska	94,445	139,552	233,997
Northumberland	64,943	231,742	296,685
Queens	82,282	219,795	302,077
Restigouche	42,124	117,800	159,924
St. John	14,569	58,789	73,448
Sunbury	28,042	114,211	142,253
Victoria	76,568	124,307	200,875
Westmorland	176,145	273,989	450,134
York	126,153	364,644	490,797
Total	1,368,023	2,901,537	4,269,560

From the above figures it will be seen that less than one-third of the occupied farm land has been improved.

AGRICULTURAL REVENUE

Agriculture is the province's leading source of revenue. The estimated gross value of farm products, the details of which are given below, was $34,307,000 in 1928, which compares with an average of $34,403,000 for the four years previous. Field crops constituted 53 per cent, and dairy products, the output and value of which have steadily increased during the last four years, 25 per cent.

Field crops	$ 18,275,000
Farm animals	3,778,000
Wool	242,000
Dairy products	8,500,000
Fruits and vegetables	1,011,000
Poultry and eggs	1,835,000
Fur farming	600,000
Maple products	32,000
Clover and grass seed	16,000
Honey	18,000
Total	$ 34,307,000


AGRICULTURE
IN
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Occupied farm lands
Acreage in each county under field crops
Cheese factories
Creameries
Combined Factories
Hungarian-process wheat mills
Meat packing plants
Fruit canneries (mainly blueberries)
Factories making complete fertilizers
Grog Brook Settlement
Grimmer Stewart & Hazen Settlements
Blue Bell Settlement
POTATOES
SHEEP
TURNIPS
BLUEBERRIES
OATS
WHEAT
LIVESTOCK
APPLES
FRUIT
SMALL FRUITS
MAY LANDS
Tant-Tomar Hay Lands
69
68
67
66
65
64
50
49
48
47
46
45

FIELD CROPS

The climate and soil of New Brunswick lend themselves to the successful production of a variety of crops, among which the principal from the point of view of acreage are hay and clover, oats, potatoes, buckwheat, and turnips. The areas by counties under each of these crops in 1929 were:—

County	Hay and clover	Potatoes	Oats	Turnips	Buck-wheat
Albert	25,581	657	4,359	556	1,560
Carleton	99,859	5,666	50,170	632	6,925
Charlotte	18,943	946	3,752	704	225
Gloucester	16,141	4,408	13,580	1,184	669
Kent	28,684	4,281	18,967	1,396	5,487
Kings	73,458	2,163	19,482	1,863	4,659
Madawaska	38,656	3,556	19,155	358	8,602
Northumberland	21,243	2,686	7,669	788	411
Queens	41,389	2,080	7,353	960	3,889
Restigouche	17,766	2,548	11,309	368	642
St. John	6,617	429	1,296	223	76
Sunbury	16,191	1,120	2,213	687	486
Victoria	26,871	5,960	18,148	457	3,988
Westmorland	64,278	3,764	19,554	2,110	3,302
York	63,526	4,951	19,523	1,504	3,612
Total	559,203	45,215	216,530	13,790	44,533

The counties of Carleton, Kings, Westmorland, and York in that order lead in acreage under hay and clover; Victoria, Carleton, York, and Gloucester in potatoes; Westmorland, Kings, York, Kent in turnips; and Madawaska, Carleton, Kent, and Kings in buckwheat. To the total value of field crops in 1928 hay and clover contributed $8,501,000, potatoes $2,372,000 (compared with $4,414,000 in 1927), oats $4,437,000, turnips $1,186,000, and buckwheat $900,000.

The total acreage under field crops in each county has changed only slightly since 1921, as is apparent from the following comparative figures:—

County	Acreage under field crops, 1921	Acreage under field crops, 1927
Albert	26,987	29,246
Carleton	157,786	163,370
Charlotte	27,897	24,103
Gloucester	60,708	37,818
Kent	75,858	65,193
Kings	90,749	107,642
Madawaska	60,720	65,695
Northumberland	43,547	32,930
Queens	46,303	59,987
Restigouche	26,655	31,490
St. John	9,352	6,014
Sunbury	20,006	20,808
Victoria	53,428	54,525
Westmorland	100,957	95,415
York	97,422	95,041
Total	897,375	889,277

In 1929 the total area was 19,382 acres greater than in 1927, and the acreages and yields of the various crops, compared with those of 1928 and 1927, were as follows:—

—	Acreage			Yield in bushels		
	1929	1928	1927	1929[1]	1928	1927
Wheat	8,916	8,856	9,871	177,000	157,900	142,000
Oats	216,530	209,085	203,536	6,756,000	6,339,000	5,227,000
Barley	9,448	8,930	6,387	247,000	246,800	147,000
Rye	565	522	359	8,000	9,000	7,000
Peas	1,753	1,562	1,192	30,000	25,000	22,000
Beans	1,515	1,416	1,448	23,000	24,500	21,000
Buckwheat	44,533	42,594	45,091	1,060,000	1,011,300	912,000
Mixed grains	4,055	3,117	2,822	116,000	88,000	65,000
				cwt.	cwt.	cwt.
Potatoes	45,215	52,239	46,998	5,736,000	6,776,000	4,204,000
Turnips	13,790	13,873	12,282	2,710,000	5,707,000	2,132,000
				tons	tons	tons
Hay and clover	559,203	554,850	556,093	736,000	796,000	712,000
Fodder corn	3,136	3,332	3,197	31,000	28,000	27,000

[1] Estimated, November, 1929.

It will be observed from the above figures that except in the case of oats little grain is produced. Buckwheat is sown fairly extensively in some counties, advantage being taken of the lighter and comparatively poor soils for this purpose; it is used locally as a food for man and live stock.

The output of wheat, which is only one-third of what it once was, has declined not on account of the unsuitability of the soil but because of the cheaper production in western Canada. The number of farmers growing wheat has been steadily decreasing and many wheat mills have closed down. Nevertheless, the provincial Government recognizing that wheat-growing is advisable for good agricultural practice and that it enables the people to be less dependent on other parts of the Dominion lends encouragement by aiding financially the construction of Hungarian-process mills for the grinding of wheat grown in approved districts. Mills of this type have now been established at twenty-five centres, the locations of which have been indicated on the map (p. 30). The counties of Carleton and Kent, which lead in wheat production, are the best served with local wheat-mills.

OPPORTUNITIES FOR INCREASED OUTPUT OF BARLEY

Neither is barley grown to any appreciable extent, the acreage in 1928, though 50 per cent greater than in 1925, being only slightly more than that under wheat. An excellent market prevails at present for a grade of barley suitable for making malt, the consumption of which has greatly increased in the last year or two as a result of the rapid expansion of the brewery industry.

It would appear that New Brunswick has the requisite soil and climate for the growing of a barley of this type. Canadian makers of malt in eastern Canada are now purchasing annually over 2,000,000 bushels of barley, the bulk of which is brought from the Prairie Provinces, Manitoba in particular, as the amount available in Ontario and Quebec is comparatively small. Moreover, there is no apparent reason why imports of malt from the United States should not be replaced, partially at least, by malt made in Canada, provided that proper consideration is given to increasing the output of the barley required by Canadian malt houses. Further, opportunities exist for the development of an export market in the United King-

dom as certain grades of barley grown in Canada have proved suitable for the making of malt used in the manufacture there of light beers, the consumption of which is tending to increase.

HAY AND POTATOES

New Brunswick is especially noted for its hay and potatoes. The moist temperate climate is ideal for the growth of clover and grasses; there is always an abundance of pasturage, and much hay is produced for both local and

Harvesting Potatoes

export purposes. In recent years attention has been given to the growing of red clover for seed, and some farmers have met with much success, securing as high as 3,500 lbs. of seed from 25 acres. The Dominion Experimental Station at Fredericton advises farmers to use red clover seed produced in Canada as satisfactory results have not been obtained in New Brunswick from the clover seed of southern Europe. The alfalfa experiments conducted at this station indicate that this forage crop can be grown successfully in the province; plots which were sown in 1922 have given splendid crops every year since.

Potatoes grow to perfection, and have an excellent reputation in Canada, the New England States, and in the West Indies, more shipments being made from New Brunswick than from any other Canadian province. The acreage in 1928 was 10 per cent greater than in 1927 and exceeded that of 1926 by more than 30 per cent. This marked increase was helped to some extent by the lower price at which the farmer secured fertilizer through the New Brunswick Agricultural Societies United, the co-operative purchasing organization for the various agricultural societies of the province which handled 33 1–3 per cent of the $1,000,000 worth of fertilizer imported in 1928. In 1929 the area was 7,000 acres less than in 1928 and represented 8·3 per cent of the total acreage in Canada planted to potatoes; the yield was estimated in November, 1929, at 5,736,000 cwt., or 12·8 per cent of that for all Canada, and its value at $8,260,000, compared with $2,372,000 in 1928.

Trade with Cuba has unfortunately been checked by the new tariff. The rates of duty prevailing in December, 1929, on Canadian potatoes (other than seed potatoes, which usually are not dutiable) entering that country, certain islands in the West Indies, Bermuda, British Guiana, and British Honduras were as follows[1]:—

Cuba—	
(a) November to June inclusive	$5 per 220 lbs. gross.
(b) July to October inclusive	$1.50 per 220 lbs. gross.
*Trinidad and Tobago	1 shilling (24 cents) per 100 lbs.
Barbados, Grenada, St. Lucia, St. Vincent, Dominica and British Honduras	Free.
Bahamas	9 pence (18 cents) per brl.
*Antigua, Montserrat and *Virgin Islands	2 shillings (48 cents) per 100 lbs.
St. Kitts-Nevis	16 pence (32 cents) per 100 lbs.
Jamaica	1 penny (2 cents) per lb.
Bermuda	4 shillings (96 cents) per bushel.
*British Guiana	40 cents per 100 lbs.

[1] According to Foreign Tariffs Division of the Department of Trade and Commerce, Ottawa.

* In the cases of Trinidad, Tobago, Antigua, Virgin Islands, and British Honduras surtaxes of 7½, 7½, 10, 2, and 25 per cent respectively are levied on the amount of duty otherwise chargeable.

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Other countries are subject to the same duties as those given above when exporting to Barbados, Grenada, St. Lucia, St. Vincent, Dominica and British Honduras, but to higher duties when exporting to Trinidad, Tobago, Jamaica, Bahamas, Antigua, Montserrat, St. Kitts-Nevis, the Virgin Islands, Bermuda, and British Guiana. With Cuba, however, the United States enjoys a preferential tariff which is 20 per cent lower than that accorded Canada.

New Brunswick potatoes are much in demand also for seed purposes and are exported in quantity under the grading and other regulations of the Root Vegetable Act—which came into effect on June 29, 1929—to Ontario and other parts of Canada as well as Newfoundland, Maine, Rhode Island, Massachusetts, Virginia, and New Jersey where they give a superior yield to locally-grown tubers. Not much effort, however, has as yet been made to ship seed potatoes to South Africa, which is at present drawing its requirements, dutiable at 48 cents per 100 pounds, from the United Kingdom, Germany, France and Kenya colony.

The potato yield per acre for the province as a whole usually averages about 117 cwt., compared with 90 cwt. for all Canada, but in such counties as Carleton, York, and Victoria crops of 175 to 225 cwt. to the acre are frequently obtained as a result of heavy applications of fertilizer and thorough cultivation. Because of these excellent cultural methods grain for seed purposes can be produced of a quality equal to the best that is imported, and the raising of this fits in admirably with the three-year crop rotation of the potato grower. Potatoes are well suited also for planting between the trees in a young orchard.

POTATO STARCH AND POTATO FLOUR

In a year like 1928 when there was a large crop of potatoes and prices were low the manufacture of starch provides an outlet for culls and potatoes which cannot be profitably marketed, and to encourage the establishment of this industry the provincial Department of Agriculture guarantees the interest charges in carrying stocks of starch up to $10,000 in value. The factory recently erected in 1929 at Hartland in Carleton county, which is capable of handling 400 barrels of potatoes a day, is the first to take advantage of this plan.

Essentials for the success of a starch factory are skilful management and assured supplies of cheap potatoes, the latter of which is contingent upon the organized co-operative assistance of those associated with the growing, grading, and marketing of potatoes. Back of this co-operation the incentive must be the stabilization of the potato market rather than the profits to be derived from the production of starch; if viewed from this angle a starch factory will materially assist the grower, but he must not expect to realize more than $6 to $7 a ton for his ungraded potatoes.

In 1928 Canada produced 2,410,601 pounds of potato starch from 15,912,220 pounds of potatoes costing $48,229, most of which, if not all, was made in 4 factories in Prince Edward Island—largely family enterprises like many in Maine. The factory selling price of this output was $96,732 according to the returns received by the Dominion Bureau of Statistics. Imports of potato starch and potato flour—which are combined in the trade figures—amounted to 4,954,241 pounds in 1928, mainly from Holland. The general tariff on such imports is $1\frac{1}{2}$ cents a pound, the British preferential and intermediate tariffs 1 cent a pound, the same duties applying to corn starch. The principal importers were manufacturers of textiles, thread, paper, starch (the corn starch producers in Ontario occasionally buy both potato starch and potato flour), bakers' supplies, sausage casings, glue and adhesive pastes.

Potato starch has to compete with corn starch, sago flour, and tapioca flour. When corn is cheap the competition is particularly difficult because 66 bushels of corn produce about 1 ton of starch as well as by-products readily marketable, whilst it requires 200 bushels of potatoes for the same amount of starch, often 225 to 250, seldom less than 200 bushels.

Potato starch, however, is superior to other starches, makes the best dextrine, and commands a premium over corn starch in the making of high-grade printed fabrics. There has always been a domestic market for what has been produced in Canada, but entry into foreign markets would be difficult in view of the competition from potato-producing countries where labour is cheaper.

Another use to which small unmarketable potatoes can be put is exemplified at a plant in the centre of a large potato area in Florida where they are canned by a process which yields a product said to be of excellent quality and readily saleable.

VEGETABLE CANNING

Although New Brunswick yearly imports appreciable quantities of canned foods, as also do the nearby West Indies and Newfoundland, there is no commercial canning of farm products such as peas, beans, asparagus, spinach, and tomatoes, except perhaps at a plant at Saint John which is making pickles and vinegar.

LIVE STOCK[1]

As in other Canadian provinces, the live stock industry was seriously depressed during the general industrial collapse shortly after the close of the Great War. During the last five years, however, the total number of animals on the farms has been slowly but steadily increasing, as may be judged from the following comparative figures for the years 1923 and 1928:—

——	1923	1928
Horses	50,644	51,713
Milch cows	106,076	109,068
Other cattle	106,825	106,085
Sheep	157,808	160,514
Swine	66,182	76,072
Poultry	817,835	996,218

If the average number of farm animals of each class during 1923 is represented by the index 100, the corresponding indices in 1928 are 102·1 for horses, 102·8 for milch cows, 99·3 for other cattle, 101·7 for sheep, 114·9 for swine, and 121·8 for poultry. Only in the case of cattle other than milch cows has there been a decline since 1923. On the other hand noteworthy progress has been made in swine and poultry, and the average per caput values of these animals in New Brunswick is not exceeded elsewhere in Canada.

[1] Sections relating to live stock contributed in part by the Dominion Live Stock Commissionner.

THE OUTLOOK

Although in point of volume the live stock industry is far below the holding capacity of the province, it is undergoing steady and intelligent development. For some years now the federal and provincial Departments of Agriculture have been working hand in hand to raise the status of the industry, giving their attention first of all to improving the quality rather than to increasing the quantity of farm animals, for upon the grade of animals depend profitable returns and a satisfactory market. That their activities are bearing fruit is evident from the noticeable upturn of late years in the average quality of production in all classes of commercial meat animals. The attitude of the New Brunswick farmer of today is changing, he now fully realizes the need for raising stock of good pedigree; and he is gradually eliminating his scrub cattle and taking advantage of the many governmental policies which have been introduced for the purpose of aiding him financially and otherwise in raising the grade of his stock. And despite his smaller holdings the industry is perhaps much sounder than at any other time in the past fifteen years and affords a better basis for permanent expansion than at any other period in the history of the province.

The possibilities for increasing the number of farm animals are distinctly encouraging. Natural conditions are ideally favourable in so far as soil, climate, and adaptability for the production of feed crops are concerned, and with improved methods of production an abundance of cheap raw material of excellent quality for the feeding of beef and dairy cattle may be economically grown. In addition thousands of acres of good pasture land could be used for feeding purposes, and larger quantities of hay could be marketed to good advantage as feed for cattle and sheep.

HORSE BREEDING

The horse industry in Canada has undergone a great change in the past year or two. The demand for horses not only in the cities and towns of Canada but also in the United States where Canadian horses have long since established a name for themselves has been so great that the difficulty has been not to find a market but rather the horses to supply the market. As a consequence horse

breeding has been resumed in many districts where it had long been discontinued. The demand and the price in New Brunswick and elsewhere in eastern Canada for horses and for good sires have been greater than at any period since 1914.

This condition should lend encouragement to the greater production of horses in the province, which in common with the other Maritimes, Ontario, and Quebec has been receiving increasingly large shipments from the Prairie Provinces to meet its requirements.

In the northerly parts of New Brunswick where lumbering is the chief industrial activity, an excellent opportunity exists for the use of horses of a high class draft type with an average weight of at least 1,400 pounds, but local demand can hardly be considered sufficient to warrant a very heavy expansion in this direction. In western New Brunswick and the St. John valley big horses are needed for the handling of the heavy potato machinery in common use there, while in the southern part of the province an outlet exists for horses of lighter weights.

The province as a whole undoubtedly offers opportunities for the raising of the very best kind of draft horses, and some very high class stallions have been imported in order to maintain quality and type in the product. The federal Government assists in grading up the horse stock through its Club Policy whereby a community is enabled to secure and retain the services of a good stallion for two or three years at a reasonable fee. All stallions travelling in the province are enrolled under a Stallion Enrolment Act which provides that no horse shall be permitted to travel the country unless his breeding and fitness have been approved; the number examined, classified, and enrolled in 1928 was sixty-eight.

CATTLE

Holsteins, Ayrshires, and Jerseys are the principal breeds of cattle for producing milk, butter, and cheese, while the Shorthorn is the most numerous of the beef type of cattle. Grades of these breeds predominate, as is only to be expected, but the quality of the rank and file of cattle has been so improved by the growth of the pure bred industry in the past few years that there are many grade

herds of dairy cattle in the province of very good producing strain. The ratio of pure breds to grades is steadily being narrowed, many head of Jersey cattle having lately been imported—250 in 1929. Many prizes have been won by dairy cattle from New Brunswick at exhibitions in various parts of Canada and the United States—entries of Holsteins from a farm near Sussex winning all four championship awards at the recently held (Sept., 1929) Brockton fair in Massachusetts, despite the fact that the general run of the exhibits was the best ever seen at that fair.

Pure Bred Holsteins

Much of the beef consumed locally is imported from Ontario and western Canada, but eventually the province will perhaps use to better advantage than at present the abundance of well-watered grass lands and cheap fodder, and by so doing may become independent upon the outside for her beef supply. It must not be overlooked, however, that dairy cattle predominate, and that what improvement in volume has taken place in recent years has been in that class of cattle, for dairying has proved quite profitable and is particularly in favour at present. Nevertheless, straight

beef-raising could be made a paying enterprise. Moreover there are many unfenced areas where store cattle could be brought in to advantage.

Some experts express the opinion that the ideal cow for New Brunswick and the Maritime Provinces generally would be one of dual-purpose breeding, or good grade Shorthorn, which would yield a liberal quantity of milk each year and bear a calf which could be turned into beef when about three years old.

Both the federal and provincial Departments of Agriculture are helping materially to improve live stock practice in the Dominion. Much attention is being given in eastern Canada to instructing young boys and girls in the proper methods of keeping, managing, and exhibiting heifers and calves. This is being effected largely through the Cattle Breeding Club and the Calf Feeding Club policies, which have revolutionized live stock standards in certain districts, notably in Quebec, and which, if yearly taken advantage of to the extent witnessed in 1929, should soon bring results equally beneficial to New Brunswick. Other policies assist the farmer in obtaining the services of pure bred bulls, boars, and rams, while the Cow Testing, Record of Performance, and Advanced Registration policies provide a means of qualification for his dairy animals. A greater utilization of these and other facilities should enable New Brunswick to develop her live stock and her growing dairy industry to a point commensurate with the province's remarkable potentialities.

Not a little credit for the improved status of live stock is due to the recently organized Maritime Marketing Board, strictly a farmers' organization, producers now being well satisfied with the prices obtained. The recent establishment of packing and cold storage plants at Saint John and Moncton in addition to those already in existence there and at St. Stephen and Sussex has provided a further outlet for good live stock, the prices for which have accordingly been stimulated.

HOGS

The marked increase during the past few years in the output of hogs, which are common to most farmers in the province, being easily and economically raised under normal conditions, has synchronized with the growth of

the dairy industry and the concomitantly greater supply of dairy by-products. The better market for hogs in 1927 further stimulated production. At the same time the quality of the hogs has so improved as a result of the application of the production and grading policies of the provincial and federal Departments of Agriculture that it is now higher than it has been at any other time in the recent history of the hog industry.

It is doubtful if any other part of Canada has made greater progress in the production, quality, and marketing of hogs than New Brunswick and the Maritime Provinces generally. But further development in the hog industry and also of dairying is contingent upon increased grain production and the adjustment of hog feed and management to include a more general use of grain feeds and the by-products of the dairy industry. This must be done in order that the costs of producing hogs may be maintained at economic levels by making unnecessary the purchase of grains for feed.

Fortunately New Brunswick has practically only one breed of hog, the Yorkshire, and that one the most suitable for making good bacon and pork; and by having imported a great deal of pure bred stock, specially selected from the best strains on Prince Edward Island, is in a position to increase rapidly both the volume and the quality of her production. In addition the province offers a very good outlet for hogs owing to the many lumber camps in yearly operation and to the development of facilities for export trade.

Hogs occupy a very important part of mixed farming practice, giving good returns for the feed consumed, maturing early, and representing a food product consumed in large quantities throughout Canada.

The provincial Department of Agriculture has long been seized with the importance of hog raising and in conjunction with the federal department is doing everything possible to encourage production by means of Swine Clubs and the organization of co-operative marketing enterprises. Boys' and Girls' Swine Clubs increased from twenty in 1926 to thirty-five in 1928—pairs of pigs being exhibited by 584 club members in the latter year—and have proved

most effective in developing bacon hogs which, though unfortunately numerically small, are of a quality, packers assert, not exceeded elsewhere in Canada, 50 per cent grading prime.

SHEEP

Sheep have been prominent in live stock activities since the early settlement days, but the present number of 160,000 is very much less than the province is capable of supporting, and not much more than the number on the farms five years ago. Rapid increases in the size and numbers of the flocks must not be expected, however, because of the difficulties in the way of fencing costs, ravages of dogs, and a not unnatural lack of interest by the settlers in the profitable potato, dairying, and fishing districts. Moreover for a number of years after the war the markets for sheep and lambs in Canada and the United States, and for wool in almost all countries, have been depressed, and this fact, perhaps more than any other, accounts for the fewer sheep holdings since 1921. Latterly, however, there has been an upward trend in market prices and the industry has been rapidly gaining. In 1926 to 1928 sheep raisers experienced one of the best periods on record, the increased tourist trade stimulating a local demand for early finished lambs and a heavier consumption by the packers early in the season, with the result that the market absorbed at very satisfactory prices a large volume of lambs throughout the late summer and early fall. In 1927 prices for lambs receded somewhat, but feeder sheep, particularly breeding stock, were in excellent demand at the prices prevailing in the previous year.

No province in Canada has better climatic and natural conditions for the successful production of sheep. It has been estimated that in New Brunswick and Nova Scotia there are 2,000,000 acres of sheep lands outside the arable, bush, rock, water-meadow, and the richer cattle grazing lands in the valleys, and that 40,000,000 pounds of mutton and 20,000,000 pounds of wool could be annually produced from this acreage.

Although the industry is a long way from being within reach of this possibility a much keener interest is being evinced in expanding production, and there has been a notable improvement in the quality of the sheep during

recent years. This is largely the outcome of the work of the federal and provincial Departments of Agriculture in the enactment of protective legislation, the importation of pure bred stock, the establishing of co-operative marketing, the holding of sheep fairs and lamb sales, the grading of breeding stock for sale, and in various ways to assist the farmer in improving and managing his flock. Under the pure bred ram premium policy, for instance, the development of community sheep-breeding centres with a recognized breed of sheep, such as Oxfords or Shropshires, in each district is being successfully encouraged. The feature of the policy requiring farmers to dock and castrate their lambs has resulted in a gain of thousands of dollars to sheep breeders in view of the cuts in ram lambs which the packing industry has instituted. Farmers qualifying under this policy have been taught also to realize the importance and value of dipping.

But perhaps the most constructive development in the past ten years has been the introduction of wool grading and co-operative selling. Unfortunately the number of farmers taking advantage of this arrangement in 1928 was small, as only 14,033 pounds were consigned for sale, on which the average net return to the grower was the high price of 30·2 cents a pound. The total wool clip was estimated at 916,007 pounds, of which a large quantity was consumed locally in the making of homespuns, which have been much in demand as a result of the greatly increased tourist traffic.

DAIRYING

The progress in the dairy industry is evident from the following figures giving the production and value of factory butter, cheese, and ice cream in each of the years 1924 to 1928:—

	Quantity			Value		
	Butter	Cheese	Ice cream	Butter	Cheese	Ice cream
	lb.	lb.	gal.	$	$	$
1928	2,039,841	696,172	196,249	790,728	149,536	287,943
1927	1,885,262	802,000	190,232	717,285	153,812	278,764
1926	1,416,355	1,059,257	163,980	508,169	181,487	243,664
1925	1,232,927	1,112,894	145,427	469,296	225,227	211,391
1924	1,159,152	871,715	136,007	405,454	142,823	164,348

It will be observed that the output of cheese has been declining. This is a result of the tendency of milk producers to give greater patronage to the creameries than to the cheese factories, as thereby they are enabled to use the skim-milk for their increasing quantities of young stock and poultry. On the other hand the production of butter was 76 per cent and of ice cream 44 per cent greater than in 1924. The value of all products of the dairy factories was about $1,250,000—an increase of nearly 75 per cent in the last five years.

Except for small shipments of butter to Montreal and Newfoundland the outputs of butter and cheese were marketed in New Brunswick and Nova Scotia. The negligible exports and the fact that domestic consumption is in excess of supply indicate the opportunity existing for continued expansion of the dairy industry, to which the province is well suited by its geographical position, the good climate with cool summer nights—which were more than usually favourable in 1927—, by abundance of pasturage, and supplies of good water always available. But the extent of this expansion will depend largely upon the extent to which dairy farmers increase their home-grown feed, or can buy mill feeds at a sufficiently low price to ensure satisfactory profits on their sales of butter fat. Some farmers in districts where dairying predominates have been reducing the number of their dairy cattle in favour of poultry and foxes—no doubt in part a result of high feed costs.

The dairying industry of New Brunswick is at present mainly confined to Kings county, but is expanding in many other parts of the province; even in the upper St. John valley where agricultural interests have hitherto devoted most of their attention to potatoes and apples there is a tendency to engage in dairying in order to provide a more balanced system of agriculture.

As a result of the efficient system of practical instruction and inspection maintained by the Dairying Division of the provincial Department of Agriculture many improvements have been introduced in factory methods. The quality of the cheese is becoming steadily better in flavour, colour, and finish; of the 9,210 boxes graded in 1927, 9,022 and 188 graded first and second respectively. How-

ever, the milk delivered to cheese factories is not as clean, sweet, good-flavoured, and well-cooled as it should be, and some factories need improvements to their buildings and equipment.

The bulk of the butter manufactured is of good quality, but as only about $3\frac{1}{2}$ per cent of the total output is graded for export the product placed on the local market often lacks uniformity in colour and content of salt and water.

Agricultural School at Sussex

There were 21 creameries and 17 cheese factories in operation in 1928, the four leading creameries from the point of view of output being at or near Sussex, Sunny Brae, Moncton, and Fredericton, and the four leading cheese factories at Anagance, Petitcodiac, Head Millstream and Sussex. Some of the factories shown on the map (p. 30) are at present unable to secure sufficient cream or milk for profitable operation, and perhaps, therefore, it would be preferable to increase the output of established creameries rather than to add to their numbers. The provincial Government assists the farmer in transporting

cream to the factory through its bonusing policy which has had the effect of placing on an equal footing all farmers who are within reach of established creameries.

The ice-cream trade is now an important branch of the dairy industry and in its expansion foreign markets should not be overlooked, for in view of the high degree of efficiency attained in modern refrigeration processes the export of ice cream can undoubtedly be extended. In recent years ice-cream made in the United States was shipped from San Francisco to Java, and Canadian ice-cream from Halifax to the British West Indies and as far south as British Guiana.

DAIRY BY-PRODUCTS

Should a time arrive when the farmers have more skim-milk than they can advantageously use for stock feeding purposes, and should they resort to a greater use of fish meal, which has proved an excellent and economical food for hogs three months after weaning, the question of making skim-milk products should not be overlooked. Among such are skim-milk powder, condensed skim-milk, skim-milk cheese, and casein. The last named is not made to any appreciable extent in Canada, but is much used at home and abroad, and a profitable export market could be built up provided that casein is made in quantity, shipped regularly, and can withstand competition from the Argentine product, upon which at present Canada, United States and Europe largely depend. The skim-milk would of course have to be collected daily from the farmers and delivered to a central casein factory.

New Brunswick has no condensed milk factory like the one at Truro in Nova Scotia or that at Charlottetown in Prince Edward Island, and when dairying is further developed this outlet for whole milk might well be considered in view of the markets that exist in the West Indies and other southern countries where refrigeration is not generally practised and the climate is a handicap to the preservation of perishable foods.

POULTRY

The poultry industry of New Brunswick is yearly assuming a more and more prominent position, and progress has perhaps been more outstanding in this field than

in any other line of live stock activity. Yet its development is still very far from that point—to which it could attain—when the province will be able to dispense with importations of eggs from the United States and from other parts of Canada and can take advantage of her geographical position not only to meet the entire provincial demand for poultry and eggs, including that of the numerous steamship companies operating from Saint John, but also to ship eggs in quantity to the United Kingdom, Newfoundland, the eastern United States and the West Indies.

In the year ending March 31, 1929, Canada's exports of eggs to the United Kingdom were 782,910 dozen, compared with 336,562 and 1,470,610 dozen in 1928 and 1927 respectively. The decline in exports in 1928 was due not to any falling off in the demand from overseas but to Canada's inability to supply more than she did because of the increased per capita consumption in Canada and the concomitantly higher price for eggs in the domestic market than in the foreign. The Maritime Co-operative Egg and Poultry Exchange has proved a most effective medium for the marketing of eggs and live and dressed poultry, and through its hatchery at Saint John has enabled the farmer to increase the volume of his poultry.

The number of poultry on New Brunswick's farms is still only about 1,000,000, which is 10 per cent greater however than in 1926, but the flocks consist usually of excellent laying strain, the result of the various policies which have been instituted by the federal and provincial Departments of Agriculture. For instance, pure-bred Barred Plymouth Rock cockerels of known laying strains are distributed, the most popular of the utility breeds and well suited to farm conditions in New Brunswick, while under the Approved Flock policy those wishing to improve their own flocks can secure hatching eggs or breeding stock from flocks of Barred Plymouth Rocks bred to the highest possible degree of production. Furthermore, the young people are being educated in the proper methods of raising and judging Barred Plymouth Rocks by means of Poultry Clubs that are formed under governmental auspices in any community where ten or more members are secured.

That the operation of these various policies is being attended with success was demonstrated at the Third World's Poultry Congress held in 1927, as a result of which

a good foreign trade in Barred Plymouth Rock cockerels and breeding stock will be assured to New Brunswick poultrymen as soon as pedigreed birds are produced in large quantities.

HONEY

The production of honey in 1928 was about 110,000 pounds compared with 120,000 pounds in the previous year. In New Brunswick white clover, fireweed and the raspberry flower are important sources of honey flow, and where the three exist crops of especially good quality are obtained.

The provincial Government gives much assistance, particularly to beginners, in regard to the use of equipment and the best methods to follow, while experimental work is carried out at the federal agricultural station at Fredericton.

Ten years ago over 35 per cent of the hives in the province were box hives with no movable frames and combs; today the percentage is less than 10, the Langstroth type, which is standard for Canada and the United States, being generally used. Such equipment and other necessary supplies can be purchased co-operatively by members of the Beekeepers Association through their organization.

FRUIT GROWING—APPLES

The wild apple trees along many a roadside, and the aged orchards here and there with some trees strong and productive despite their 100 years emphasize the fruit-growing power of New Brunswick's soil and climate. Indeed, the valley of the St. John river could be developed perhaps into the best apple producing region of the Dominion, and yet many an ideal spot among the sloping lands along this river, and hundreds of acres of equally good soil near Sheffield and Maugerville, around French, Maquapit, and Grand lakes, and in those more southerly sections of the watershed that border upon Washademoak lake and Belleisle and Kennebecasis bays remain unplanted, or hold, maybe, the relics of once famed orchards. Moreover in the counties of Albert, Charlotte, Westmorland, and Kent the commercial orchards could be greatly extended if varieties of fruit trees were grown to which each of these counties is peculiarly suited.

The commercial apple crop was 22,000 barrels in 1928 and has averaged in the five-year period, 1924-28, about 30,000 barrels—a very small amount compared with what the province is capable of producing. On October 1, 1929, the crop of the St. John river valley was estimated at 20,000 barrels, Wealthy, Dudley, Bishop Pippin, Ben Davis, and McIntosh being the leading varieties. The last named is in particularly keen demand in Montreal, but expansion in this market for New Brunswick apples, generally, depends upon the growers shipping in quantity a good product only,

A Fruit Farm on the Saint John River

properly packed in conformity with the method desired by the purchaser. It is only by such means that satisfactory markets can be built up and the orchardist assured of adequate financial returns. The wisdom of proper packing was brought forcibly home to the grower by the introduction in 1927 of the bushel hamper, which enabled the home-grown apple to sell well and command a good price in competition with the imported Nova Scotia apples which often heretofore had dominated the local market at certain seasons.

The yearly production of apples, though normally too large for the domestic market solely, is not large enough for the development of a satisfactory and more remunerative export trade. If it were—and the requisite output is possible of attainment—there is no reason why New Brunswick should not be able to compete with other countries in the markets even of India, Egypt, Switzerland, France, Spain, Cuba, and South America.

Towards remedying existing conditions the orchardist is being urged to grow only those marketable varieties of apples that possess the quality demanded by the consumer and that can be readily produced under the conditions prevailing in the province; at present too many varieties are being grown which are not altogether suitable for outside marketing because their keeping qualities are not dependable. Proper development along these lines is being brought nearer as a result of the long-continued activities of the federal Department of Agriculture in originating new and better varieties, some of which should prove ideal in New Brunswick for the purpose intended. So successful has been this work that fall apples like Duchess, Dudley, and Wealthy, now rather extensively grown in the province, will probably be replaced by others of McIntosh origin which are superior in colour, flavour, and general attractiveness. Worthy of special mention for this purpose are the Melba, an early apple, and the Lobo, a fall apple, two new varieties which should appeal to the orchardist. A need is a good late winter apple of high colour and quality adaptable to the province's growing conditions.

Other remedial measures relate to greater co-operation in all operations from the planting of the tree to the marketing of the fruit. In this connection the New Brunswick Fruit Growers' Association which now has a membership of about 270 compared with 34 at the time of its organization continues to do excellent work, while much is expected from the New Brunswick Apple Exchange which was organized in 1927 by the principal apple growers to encourage the consumption and to promote the marketing of New Brunswick apples. And as an aid to the more rapid development of the industry, Community Orchard Clubs are being formed at the suggestion of the provincial horticulturist in those many favourable areas where there is now little or no commercial fruit production, and if the

excellent progress made by the first club since its inception at Woodstock in December, 1927, is paralleled by others, and new and existing orchards continue to be extended as they were in 1928, the province's commercial apple crop should in time greatly increase.

In matters relating to rates, box packing, and conditions of carriage for fruit, advantage should be taken of the services of the Transportation Division of the Fruit Branch of the federal Department of Agriculture.

SMALL FRUITS

Strange to say the commercial output-value in 1927 of apples was less than that of strawberries. In no other province do strawberries, raspberries, cranberries, and other small fruits grow to better advantage, and as they mature later than the similar fruits of Ontario, Quebec, and the New England States their marketing at satisfactory prices should present little difficulty, but the successful development of the small fruit industry on a large scale depends upon adequate transportation at reasonable cost; organized marketing for both local and export trade; the adoption of standard boxes and shipping crates; and canning factories to ensure stable markets.

The commercial strawberry crop in 1928 was 660,000 quarts, compared with 1,000,000 in 1927, and came largely from the St. John and Kennebecasis valleys and the area around Sackville. The decreased output was a result of heavy winter killing to plantations. The results of several years' experiments conducted at the Fredericton Experimental Station indicate that Ozark, Senator, Dunlap K, Premier, and Glen Mary are the best yielding varieties for the province. The marketed output of raspberries in 1928 was 28,000 quarts and of all other berries excepting strawberries 190,000 quarts, to which wild blueberries, which are remarkably free from defect in New Brunswick, contributed a large part.

Much interest is now being centered in the latter fruit as a result of the success obtained in New Jersey in the cultivation of the high-bush blueberry, and experiments are being conducted to determine whether or not this variety can be grown successfully in Canada, and to what extent both the native high-bush and low-bush species will succeed under cultivation.

The yearly enormous demand for blueberries has never yet been fully satisfied by the available supply. The legislature of Nova Scotia recently passed an act to encourage the cultivation of blueberries. Blueberry Associations have been formed all over Nova Scotia and the Government of that province has co-operated through its forestry branch in selecting areas best suited to the growth of berries and burning them over under expert supervision. Blueberry culture along somewhat similar lines has recently commenced in New Brunswick, and already some excellent areas have been developed.

FRUIT CANNING

Of the 1927 commercial output of strawberries, between 150,000 and 200,000 quarts went to a fruit-canning plant at Coldbrook near Saint John, now unfortunately not operating. This plant had been in existence only since 1926 and was handicapped in the first year of its operations by insufficient fruit supplies, a difficulty that was not experienced to anywhere like the same extent in 1927. It goes without saying that the success of a factory of this nature is contingent upon its securing regular supplies of fruit of good quality, upon careful management, and upon the production of a satisfactory product. The fact that excellent strawberries can be obtained at a price per pound which is probably much lower than many jam makers elsewhere in Canada have to pay should be conducive to the output of a product which need not fear competition in eastern Canadian markets. Blueberries are canned in appreciable quantity at plants in Inkerman, Richibucto, Chatham and Tracadie.

This represents the present extent of the fruit canning industry. Last year (1927) a company in Saint John was engaged in making candied fruits, but operations were discontinued in 1928. The possibility of a canning or dehydrating plant, or a by-product factory, to treat the cheaper grades of apples has been considered, but it has been shown that the present available supply of such apples is not large enough to render profitable the establishment of such a plant. The dehydration of blueberries is no doubt similarly handicapped.

FORESTS AND FORESTAL PRODUCTS[1]

THE timber, game animals, and inland fisheries of the unbroken tract of magnificent forest with which New Brunswick was covered when first found three centuries ago gave to the early pioneer the means of livelihood, and despite enormous depletion since that time contribute annually at this day $30,000,000 to the wealth of the province and a net revenue of more than $1,200,000 to the treasury. If are included all dependent activities these resources account for more than 40 per cent of the entire net productiveness of the province.

In the value and importance of their products the forests rank second only to the agricultural lands. They cover 21,476 square miles[2] or 76·9 per cent of the land area, and on this acreage the total stand of spruce, balsam (locally known as fir), jack pine (locally known as princess pine), poplar, and hemlock is given in the report (1924) of the Pulpwood Commission as 37,672,646 cords, 90 per cent of which consists of spruce and balsam. About 19·1 million cords of this amount are on lands, embracing 10,675 square miles or slightly less than half the forest area, which have been alienated in fee-simple and are therefore not subject to the control of the province in matters relating to methods of operation and the place of manufacture of the raw material. Of the remaining 10,801 square miles of forests lying largely in the central and northern parts of the province, all has been disposed of under long-term license or lease from the Crown except 1,680 square miles, on which, however, the timber amounts to only 537,600 cords and is so widely scattered that it cannot be exploited successfully for either saw-mill purposes or pulp operations. The largest areas of practically unbroken Crown forests lie in Restigouche, Gloucester, Northumberland, and Kent counties.

[1] Prepared in part with the assistance of the Department of Lands and Mines, Fredericton, and the Forestry Service of the Department of the Interior, Ottawa.

[2] In the special report to the British Empire Forestry Conference of 1928 the provincial Government estimates, from its own surveys of 7,000 square miles of Crown lands, that the forest area is 20,326 square miles (44·82 per cent of which is in the hands of corporate bodies and private individuals and 55·18 per cent under provincial control) or 72·8 per cent of the land area of 27,911 square miles; and that the area of merchantable timber is 18,032 square miles (90 per cent of which has been logged over for some species of softwood at least once during the last 150 years) or 64·6 per cent of the land area. These estimates, however, do not include the wood-lots on the unimproved land, about 4,500 square miles, held by farm settlers.

EXTENT AND DISTRIBUTION OF MAIN TYPES OF FOREST GROWTH

The following table gives the results of the survey by the provincial Government of 4,477,794 acres, or nearly 7,000 square miles, of forest lands under its control. It must not be overlooked, however, that these figures are based upon surveys some of which were undertaken more than 10 years ago, since which time many changes have taken place that will materially affect the estimates given below. For instance, regulations have been introduced to enforce cutting to lower stumps, and greater use is being made of smaller material in tree tops and of defective material for pulpwood. And though consideration of these factors alone would result in an appreciable addition to the amount of available timber, allowance would have to be made for the damage to forests from insects, fire, and other causes.

	Acres	Per cent
Softwood forests	2,083,835	46·5
Mixed hardwood and softwood forests	1,572,581	35·1
Hardwood forests	147,959	3·3
	3,804,375	84,9
Burnt-over lands	481,856	10,8
Barrens, bogs, swamps, lakes, etc	191,563	4·3
	4,477,794	100·0

It will be observed that 84·9 per cent of the surveyed area was timbered and that less than 5 per cent consisted of land unproductive of forests. The extent of the timber on this acreage was estimated as follows:—

	Millions of ft. b. m.	Per cent
Merchantable softwoods—		
(Spruce, cedar, white and red pine, hemlock, 12" and greater; jack pine, 10" and greater; balsam fir, 9" and greater) [1]	3,445	18·3
Hardwoods—		
(Yellow birch, maple, beech, 12" and greater; white birch, poplar, 8" and over)[1]	3,086	16·4
Total merchantable	6,531	34·7
Undersized softwood (down to 6" on stump)	7,671	40·8
Undersized hardwood (down to 6" on stump) including cordwood material	4,609	24·5
Total undersize	12,280	65·3
Grand total	18,811	100·0

[1] Under present cutting regulations (v.p. 81) diameter limit of yellow birch has been increased to 14 inches and those of other species, except balsam fir, maintained at former dimensions. In the case of balsam fir there is no cutting restriction except on surveyed and approved lots for settlers where a diameter limit of 9 inches is enforced.

Assuming that the above figures, which relate to 7,000 square miles of Crown forests only, apply equally well to the freehold forest lands, which cover some 10,000 square miles, 18·3 per cent of the standing timber throughout the province consists of merchantable softwoods, and 16·4 per cent of merchantable hardwoods, the balance, viz., 65·3 per cent, being under merchantable size. The proportions of the different species contributing to the merchantable stand given in the foregoing table were:—

	Per cent		Per cent
Spruce (white, black, and red)	27·71	Yellow birch	14·79
Balsam fir	9·71	White birch	16·35
White pine	3·74	Maple	7·71
Red pine	0·66	Beech	2·21
Jack pine	1·05	Poplar	5·06
Cedar	7·84	Ash	1·04
Hemlock	2·03	Other species	0·19

THE SOFTWOOD TYPE

This type containing not more than 10 per cent of hardwoods is found everywhere. It consists usually of a mixture of spruce and balsam fir growing in the valleys and lower slopes of the north and on the hillsides and plains in the centre and south. Spruce is the leading species by volume, although balsam is rapidly ousting it on cut-over lands.

On the northern Silurian soils white spruce, the commonest of the three spruces (white, red, and black) occurring in the province, predominates in the bottom lands, attaining a height of 100 feet and a diameter of $2\frac{1}{2}$ feet in the Restigouche watershed, but gives way to balsam fir on the slopes and knolls.

In the central and southern districts the softwood type includes red and black spruce, with balsam fir the most extensive on the central plateau in Northumberland, Victoria, and Restigouche counties. This plateau contains the highest land of the province—averaging 1,300 feet, with peaks as much as 1,416 feet above this level in the case of mount Carleton at the headwaters of the Tobique, Nipisiguit, and Miramichi rivers near the northwest corner of Northumberland county. Red spruce grows well in upland soils, reaching 80 feet and a diameter of 18 inches.

The softwood-type is segregated into sub-types depending on the chief species present:—

(a) Spruce-Balsam

The conditions in this sub-type, which is much more extensive than any of the others, have already been described.

(b) Cedar

In this sub-type northern white cedar (commonly known as cedar) is the main species with small percentages of white spruce, black spruce, and balsam fir. It is found in nearly pure stands in the swamps and bottoms of the softwood lands, particularly in the north, but has been seriously depleted by fire and logging in some parts of the Restigouche watershed.

(c) White and Red Pine

Only a few mature stands of this once prominent type now exist, mainly in the sandy areas of the Carboniferous region.

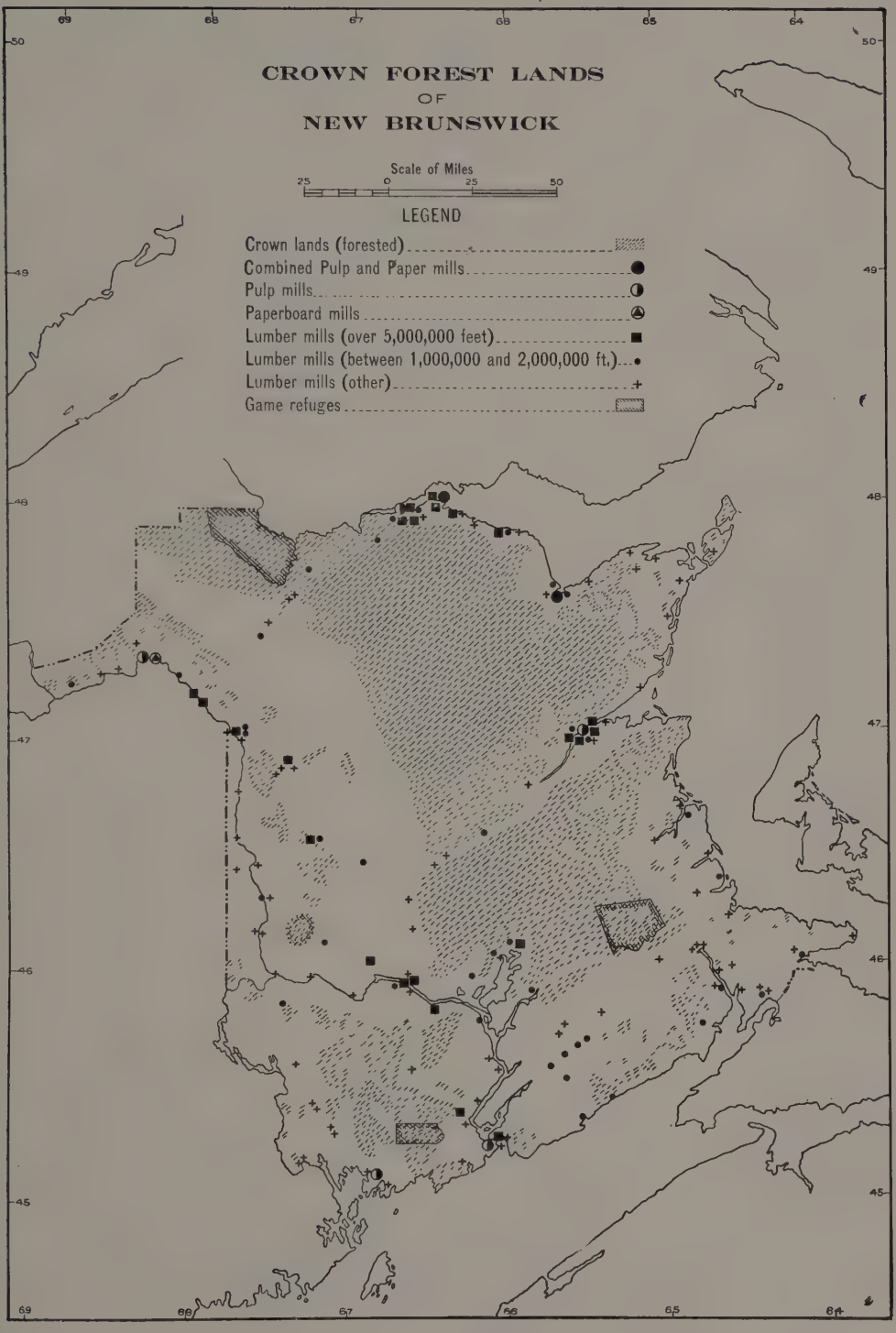
(d) Jack Pine

This type, largely temporary, is found in dense, almost pure stands on the central plateau and Carboniferous areas where fires have removed the original timber, particularly on the sandy soils of the eastern coast north of the Miramichi river. It constitutes about 1 per cent of the merchantable timber in Crown forests.

(e) Black Spruce-Larch

Black spruce occurs on the moist sandy bottoms and swamps of the Carboniferous area and on the stony hillsides of the central plateau and granite belt. In the swamps it grows densely but very slowly, seldom attaining 12 inches on the stump.

Eastern larch (tamarack or hackmatack) occurs in swamps and moist situations along river valleys, but despite its rapid growth it will never constitute much more than 2 per cent of the province's timber. Prior to the ravages in 1880 of the larch saw-fly it was much more extensive, and although new stands have since reached


CROWN FOREST LANDS
OF
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Crown lands (forested)
Combined Pulp and Paper mills
Pulp mills
Paperboard mills
Lumber mills (over 5,000,000 feet)
Lumber mills (between 1,000,000 and 2,000,000 ft.)
Lumber mills (other)
Game refuges
69
68
67
66
65
64
50
49
48
47
46
45

commercial size the insect has again appeared in the Miramichi district, threatening a repetition of the former damage.

(f) Hemlock

This type, consisting in New Brunswick of only one species of hemlock, is found in nearly pure stands or in admixture with a small percentage of spruce, balsam fir, and hardwoods over the southern half of the province with the exception of a narrow strip along the east coast as far north as Bathurst. Cut-over hemlock lands are not reproducing this type to any extent, which will therefore soon become extinct, for it now forms only about 2 per cent of the merchantable timber on Crown lands.

HARDWOODS

The best hardwood stands occur in the middle and upper reaches of the St. John and Restigouche river watersheds, along the Tetagouche and upper St. Croix rivers, and in Albert county. Much birch, beech and maple occur in the Napadogan district in the northerly half of York county.

Yellow birch forms 31[1] per cent of the merchantable hardwoods, of which it is probably the most important species, occurring throughout the province in the old growth stands, where there are large supplies not yet cut to any marked extent. White birch occurs in even greater quantity.

There are five species of maple, and of these sugar maple is fairly abundant, especially in the northwest; it forms 7·71 per cent of the merchantable timber, or 16 per cent of the hardwoods. The other varieties are far less extensive and usually found on lower, less favourably drained lands. Beech of excellent quality occurs in the southeast of Albert county, but the European beech bark louse has unfortunately gained a foothold, endangering the stands there and elsewhere. The white and red oaks, once occurring in appreciable quantity, are now only found as scattered trees in the lower St. John valley and in the watershed of the Miramichi. Ash stands make up 1·04

[1] This and following percentage figures in this section relate to merchantable timber stands in Crown forests.

per cent of the total timber, and of the two varieties found the white is much less plentiful than the black, which occurs in the rich swales bordering the hardwood slopes. Basswood is confined to the St. John valley but not in sufficient quantity to be of commercial value.

HARDWOOD TYPE

Although found throughout the higher lands with the exception of parts of the central plateau, the hardwood type containing deciduous trees to the extent of 90 per cent or greater covers in actuality only 3·3 per cent of the forests on Crown lands. Usually consisting of hard maple, yellow birch, and beech, it varies widely in composition according to the soil and the latitude. For example, in the northwest of the province almost pure stands of hard maple line the hill tops, yellow birch being a rarity and beech non-existent, whilst in the St. John river watershed and along the rivers entering Chaleur bay yellow birch and hard maple are the principal species, only a small percentage of beech being present. On the other hand, in the Carboniferous and granite regions of the south the predominating species is a somewhat poor quality of beech, and much less than the usual amount of maple is present.

On account of rapid reproduction on burnt over lands pure or semi-pure stands of white birch and poplar are common, attaining commercial size often before the softwoods have made much headway.

MIXEDWOOD TYPE

In this type, which is prominent on the lower and upper slopes throughout the province and covers 35·1 per cent of the Crown forest lands, hardwoods and softwoods occur intermingled, yellow birch, maple, beech, and, to a less degree, poplar, white birch and red maple, being the principal species of the former; spruce, balsam fir, and, to some extent in certain areas, white pine, red pine, hemlock, and cedar, of the latter. In most of these mixedwood stands there has been much cutting of softwoods and the old growth hardwoods remaining have hindered the reproduction of spruce and fir.

The temporary mixedwood type arising in many areas after fires has usually been cut-over only when the softwoods have reached commercial size, by which time the poplar and birch have become over-mature.

Taking on Cargo at Chatham

LUMBER AND PULP AND PAPER INDUSTRIES

In the Royal Commission's report the accessible and merchantable spruce and balsam timber, from which the supplies required for both pulpwood and lumber have to be drawn, was estimated at 26,600,000 cords and the average annual consumption of these species in the decade 1913-22 at 1,100,000 cords. Granting the reliability of these estimates it is apparent that without actual increase in the timber grown the lumber and pulp industries cannot both be permanently maintained at their previous rates; one must perforce suffer at the expense of the other, for despite the favourable conditions for regeneration in New Brunswick generally, and particularly so along the bay of Fundy coast, the annual increment in the spruce-balsam type was outweighed four to one in the period 1913-22 by

the decrement through fire, budworm (the epidemic of this insect has fortunately subsided), fungus and other causes, aside from industrial consumption.[1]

An economic adjustment in these industries has been under way for some years now. The opening of the Panama canal has enabled the Pacific coast operators to place on the eastern markets high grade lumber, which has seriously competed with the products of New Brunswick's forests. Simultaneously a great part of the market this province formerly enjoyed in Europe has been lost to Sweden, Norway and Finland; the United Kingdom's purchases being now only a small percentage of what they were in 1920.

Lumber Mill and Logs on the Miramichi

What spruce lumber is imported into the United Kingdom from Campbellton, Bathurst, Dalhousie, Chatham, and Saint John goes largely to the west of England and to Ireland for use in house construction and for packing cases, the east coast ports importing Baltic woods which have the advantage of proximity and seem to be favoured notwithstanding that Canadian spruce is well known and appreciated in other parts of England.

[1] Report of Royal Commission on Pulpwood (1924), p. 38.

The Imperial Institute Advisory Committee on Timbers stated[1] that if Canadian softwoods are to compete more successfully with European timbers, it is important that they should be well seasoned and that the sawn lumber should maintain a high standard of manufacture and accuracy of measurement which has sometimes been lacking in the past. The timber should also be available in as full a range of sizes as possible.

Needless to say the reduction in the sizes of logs—and consequently of the better grades of lumber—has been a factor in this decline of New Brunswick's trade. The supplies of white pine, once a most important asset, have dwindled to quite small proportions, as have also those of hemlock, a species which will soon become extinct as a commercial wood of the province. In only one year since 1913 has hemlock ever contributed more than 6 per cent or white pine more than 8 per cent to the annual lumber output.

The production in 1927 of lumber, lath, and shingles is given below. The number of operating saw-mills was 233 and the capital invested in the lumber industry, $20,555,201.

—	Lumber		Lath		Shingles	
	M ft. b.m.	$	M	$	M	$
Spruce	268,081	6,721,849	363,442	1,579,624	1,338	4,157
Balsam fir	21,736	521,485	11,880	50,857	4	12
White pine	14,218	413,166	17,033	74,128	106	318
Birch (yellow)	11,351	365,812	–	–	–	–
Hemlock	8,743	211,766	12,956	54,767	–	–
Maple	3,730	127,774	–	–	–	–
Beech	2,175	65,901	–	–	–	–
Birch (white)	1,617	54,959	–	–	–	–
Red pine or Norway pine	1,430	32,311	130	600	400	1,000
Jack pine	500	10,500	–	–	–	–
Cedar	479	7,226	2,281	9,499	152,289	487,273
Poplar or Cottonwood	127	2,489	–	–	–	–
Ash	58	2,007	–	–	–	–
Elm	56	1,880	–	–	–	–
Tamarack or Larch	21	514	–	–	–	–
Basswood	10	295	–	–	–	–
Unspecified	1,063	16,066	6,507	31,593	–	–
Total—						
1927	335,395	8,556,000	414,229	1,801,068	154,137	492,760
1926	381,673	9,656,279	484,196	2,362,491	150,776	443,206
1925	405,203	10,513,568	486,970	2,491,994	187,088	539,317
Average—						
1919-23	412,655	12,652,993	263,841	1,486,328	246,374	963,329

[1] Descriptive List of Some Empire Timbers (1928), Imperial Institute.

Among the provinces New Brunswick holds fourth place in lumber, first place in lath, and third place in shingle production. Compared with ten years ago the output of lumber has fallen 44 per cent, and of spruce lumber alone, 42 per cent. The production of lath, though still accounting for about one-third of the total manufactured in Canada, fell off in 1927 and 1928 on account of poor market conditions. The output of shingles has also fallen rapidly since 1924; but though large supplies of

Lumber Mill Near Fredericton

cedar were burnt in the very serious fire of 1923, which covered about 400 square miles in the Upsalquitch watershed, and many excellent stands have been cut in the north during the past ten years, considerable quantities are still available from which substantial amounts of cedar shingles and poles are being annually obtained. The output of hewn railway ties (exclusive of sawn ties) from Crown timber has increased in the last 2 years from 76,000 to 189,960 as a result of the greater use of jack pine for this purpose.

Geographically New Brunswick is favourably situated to compete in foreign markets both on this continent and Europe, but successful competition depends upon shipments of high quality lumber, a not altogether easy matter in view of the greatly diminished resources of really excellent coniferous timber. There is no valid reason why New Brunswick softwoods should not replace European woods of the same class as long as they can be landed at competitive prices. Canadian spruce has been accepted by the British War Office as an alternative to European softwoods. And despite the tariff imposed by the United States, it should not be difficult for the province to regain its former strong footing in some of the nearby New England States provided that operating costs are sufficiently low and greater publicity is given to the merits of New Brunswick lumber. Furthermore, the possibilities of increased trade with the West Indies and Newfoundland in softwood lumber and finished products, such as sashes and doors, are far from being exhausted.

According to the Maritime Trade Commissioner in Ontario the lack of any co-ordinating agency in the lumber industry of the Maritimes is a handicap, necessitating in the event of an inquiry for, say, 1,000,000 feet of spruce his circularizing all dealers in such lumber, many of whom are probably not in a position to fill such an order wholly or in part.

PULP AND PAPER

The pulp and paper industry on the other hand has been steadily gaining ground, and its output is expected to be very greatly increased as soon as the new plants under construction have been completed. The erection of these plants had been withheld in the past partly because the companies had not acquired sufficient timber limits from the saw-mill operators and partly because of the insufficiency of hydro-electric energy. But now that large transfers of leased and privately owned limits have been effected, the Grand Falls site on the St. John river developed, and an additional 5,000 horse-power has been made available on the Nipisiguit river, a decided impetus has been given to the production of ground-wood pulp and to pulp and paper enterprise generally, additionally aided as these

industries are by the numerous rivers and streams of the province which place within reach almost all the softwood timber resources.

Prior to 1923 when paper making was first undertaken in the province at Bathurst, the output of those mills that had long been in operation consisted entirely of various kinds of pulp, mostly for export. The capital invested in the industry stood at $18,322,185 in 1927, but the projects under way, including power plants and transmission lines, involve an additional $40,000,000. In 1927 there were

Newsprint Mill at Bathurst, the First in the Maritimes

four pulp mills and one pulp and paper plant, the rated yearly capacity of the groundwood mills being 44,000 tons; of the chemical pulp mills, 132,000 tons; and of the newsprint mill, 20,000 tons. The actual output, however, of groundwood pulp was 22,372 tons; of sulphite (bleached and unbleached) and sulphate pulp, 130,000 tons; and of newsprint about 20,000 tons (14,200 tons in 1928). Five years previous to this the total output in pulp of all grades was 104,822 tons, 95 per cent of the capacity of the plants at that time.

In the latter part of 1928 was commenced the construction at Dalhousie of a complete newsprint mill which will have an initial output of 250 tons daily, and at Beauly (Athol) of a bleached sulphite mill with a daily capacity of 150 tons. Recent additions to the plant at Edmundston and to the one in Maine on the opposite side of the river to which pulp is pumped from Edmundston in slush form make possible a yearly output of 51,000 tons of paperboard and of 66,000 tons of fine catalogue paper in addition to pulp for sale, while at Bathurst are being installed a third pulpwood grinder and an additional machine in order to double the present output of newsprint at that place. And although there is as yet no combined pulp and paper mill in the district adjacent to the Miramichi river where large supplies of wood are available, investigations are being conducted to determine sources of electrical energy in the event that such a mill or another pulp mill is planned.

The further expansion of pulp and paper manufacture will depend, as already has been stated, upon the extent to which spruce and balsam are consumed for other purposes and also upon the application to pulp-making of woods other than those now employed. The proportion of balsam to spruce now used by the pulp mills of New Brunswick is greater than in any other province on account of the relatively larger quantities of balsam and of the efforts which have been made to salvage trees affected by the budworm. Of the 292,165 cords of pulpwood consumed domestically in 1927, 165,359 were of spruce, 113,689 balsam, and 13,117 jack pine; 32 per cent of this amount of pulpwood was cut from limits owned or controlled by the pulp and paper companies, most of which have pulpwood reserves also in Quebec and elsewhere, whilst the greater part of the remaining 68 per cent was purchased from farmers, the companies thereby conserving their own forests and at the same time maintaining a market for timber from the settler's wood-lot. An additional 177,236 cords, of which 20 per cent was probably poplar, were exported, mainly to the United States, and although this did not all originate in New Brunswick the part not so originating was more than compensated for by the appreciable amount (not included in the 177,236 cords) of the domestic cut shipped through Quebec and Ontario ports.

The conditions for natural reproduction of the pulpwood species are very favourable in New Brunswick. In some districts the number of seedlings is actually greater than 50,000 per acre. Moreover, the growth rate is rapid, terminal shoots of 20 to 30 inches being of common occurrence. It ought therefore to be possible to make the softwood forests of New Brunswick support indefinitely both the existing wood-using industries and those now being established, provided that proper forest care is continually exercised, all mature and defective timber removed, and no more serious fires or insect epidemics occur.

Newsprint Mill Under Construction at Dalhousie

In addition to their use in pulp and paper making and as unmanufactured lumber for domestic and foreign markets, the softwoods are converted at a number of places in New Brunswick into semi-finished or finished products, among which box shooks hold a prominent place, as will be apparent from the sketch map on page 74. Canada is a large producer of box shooks and exports appreciable quantities to the West Indies, the Straits

Settlements, the United Kingdom and New Zealand, but nevertheless imports yearly from the United States about 12,000,000 feet of shooks made usually of wood not indigenous to Canada.

HARDWOOD INDUSTRIES

In the winter of 1927-28 the total cut of saw-timber from Crown lands was 306,000,000 feet compared with 253,000,000 feet in the corresponding period of the previous year, the increase resulting mainly from 53,000,000 feet of pulpwood salvaged from the 1923 fire in Restigouche county. The amount of hardwood included in this 306,000,000 feet was 11,000,000 feet, which, though 3,000,000 feet greater than in 1926-27, represented only 3·6 per cent of the total cut of Crown timber. For the entire province a saw-mill cut of 335,000,000 feet in 1927 (v. table on p. 64) was reported, of which some 19,000,000 feet (46 per cent more than in 1926) was from hardwoods, yellow birch accounting for 59 per cent, maple 20, beech 11, white birch 8, and all others 2 per cent.

Much yellow birch is shipped to England, France, and the New England states for plywood and veneer stock, some for use in furniture and carriage-building factories, and some for the making of railroad ties and various minor products such as boxes for the tinplate[1] made in South Wales. The bulk of the overseas exports of white birch goes to Scotland in the form of spool bars. The Imperial Institute Committee on British Timbers was of the opinion that the export trade in white birch from eastern Canada could be largely increased and an important market developed in the United Kingdom for this wood and also, probably, for beech used in chair and couch frames, if the price did not exceed that of English beech. To ensure obtaining the best export prices specifications must be rigidly adhered to; hardwood for the United States for instance should preferably be cut and shipped in conformity with the inspection rules of the National Hardwood Lumber Association.

Yellow birch is a suitable wood, as also is maple, for making the distillation products wood alcohol, acetone,

[1] In 1929 the Department of Trade and Commerce received inquiries for eastern Canadian birch and beech for this purpose.

acetate of lime, and charcoal, but no such plant exists in the province. Ash, which is valuable for shovel and other tool handles, skis, vehicle stock, cars, agricultural implements, and for interior woodwork, is being used locally only for minor articles like baskets, snowshoe bows, and barrel hoops.

In view of their extent and the fact that they have been only lightly cut in the past the hardwood timbers constitute a resource offering excellent opportunities, especially those species to which portable saw-mills could be brought from near-by railways or which could be economically logged and then river driven subsequent to special treatment in the woods to ensure buoyancy.

The fact that hardwood stands along the rivers are usually not large enough to warrant the erection of stationary saw-mills is a handicap. But the paramount problem is transportation, freight rates charged by steamers and sailing vessels calling at ports not on a regular steamship line being generally so much higher than for spruce and balsam if more than 20 or 30 per cent of the cargo consists of hardwoods that profitable shipment in this way is frequently an impossibility.

A factor however in New Brunswick's favour is the gradual depletion of the hardwood supplies in the United States. The scarcity of high-grade hardwood in New England forced the furniture industry several years ago to move to the Middle West, but the timber there has been largely consumed during the last 25 years; the only remaining areas of hardwoods are in the north and south, and these are limited in extent. When the forests in the more remote and inaccessible parts of the southern Appalachians and the lower Mississippi valley have been cut, the furniture industry will have exhausted its last domestic resource of old growth timber. The present scarcity of high-grade hickory and ash in the accessible forest areas of the southern states has compelled makers of vehicles and automobiles to use steel substitutes.

To aid in the greater development of the hardwood forests in New Brunswick the provincial Government is exerting every effort, and has recently appreciably reduced the stumpage rates on this class of timber. As yet, however, such hardwood products as flooring, railway ties, furniture,

veneer stock, turnery, last blocks, peg wood, chair bottoms, tool handles, motor-bodies, wagons, spool bars, interior woodwork, cooperage, snow shoes, printing blocks, hockey sticks, card tables, brush backs, canoe paddles, skis, maple sugar and syrup, are not being made to any appreciable extent, except in a few instances, although more consideration has latterly been given to the production of some of these materials.

The market for completely manufactured articles like furniture, which is made in five factories, the more important of which produce office, church and school equipment, has been largely confined to the province. There are fifteen places where barrels or cooperage stock are made or assembled, but the output in the majority of cases is small, many of the plants operating intermittently. On the other hand the plant built at Newcastle in 1924 is steadily increasing its yearly output of creosoted railway ties and lumber, for which purpose large quantities of beech, yellow birch, and maple are used. In 1928 were creosoted in all 395,000 railway ties, 1,200,000 feet of lumber, and 103,000 cubic feet of piling and poles. Slabs sawn off in making hemlock ties are now being driven down the Renous and Miramichi rivers to Nelson for conversion into lath.

It might not be out of place to give here a few facts taken largely from the more recent reports of Canada's trade commissioners regarding some outside market possibilities for certain hardwood products either not now made in New Brunswick or else produced in only small quantity for local consumption.

HARDWOOD FLOORING

In England maple flooring is well and favourably known, being regularly used, particularly in textile factories and public buildings. The United States is the main source of supply but the Canadian product has no difficulty in selling when able to meet competitive prices. Attempts to introduce Canadian birch flooring have thus far been disappointing, for birch is considered a much inferior wood to maple. Importers contend that in order to create a demand for birch it would have to sell at about four-fifths of the price of maple.

A not uncommon opinion in the United Kingdom is that Canadian birch is like Finnish birch, difficult to stain and polish. To countervail this opinion a display of birch flooring is recommended at the annual British Industries Fair (London and Birmingham) and the various Ideal Home and Builders' Exhibitions.

SPOOL WOOD, BIRCH SQUARES

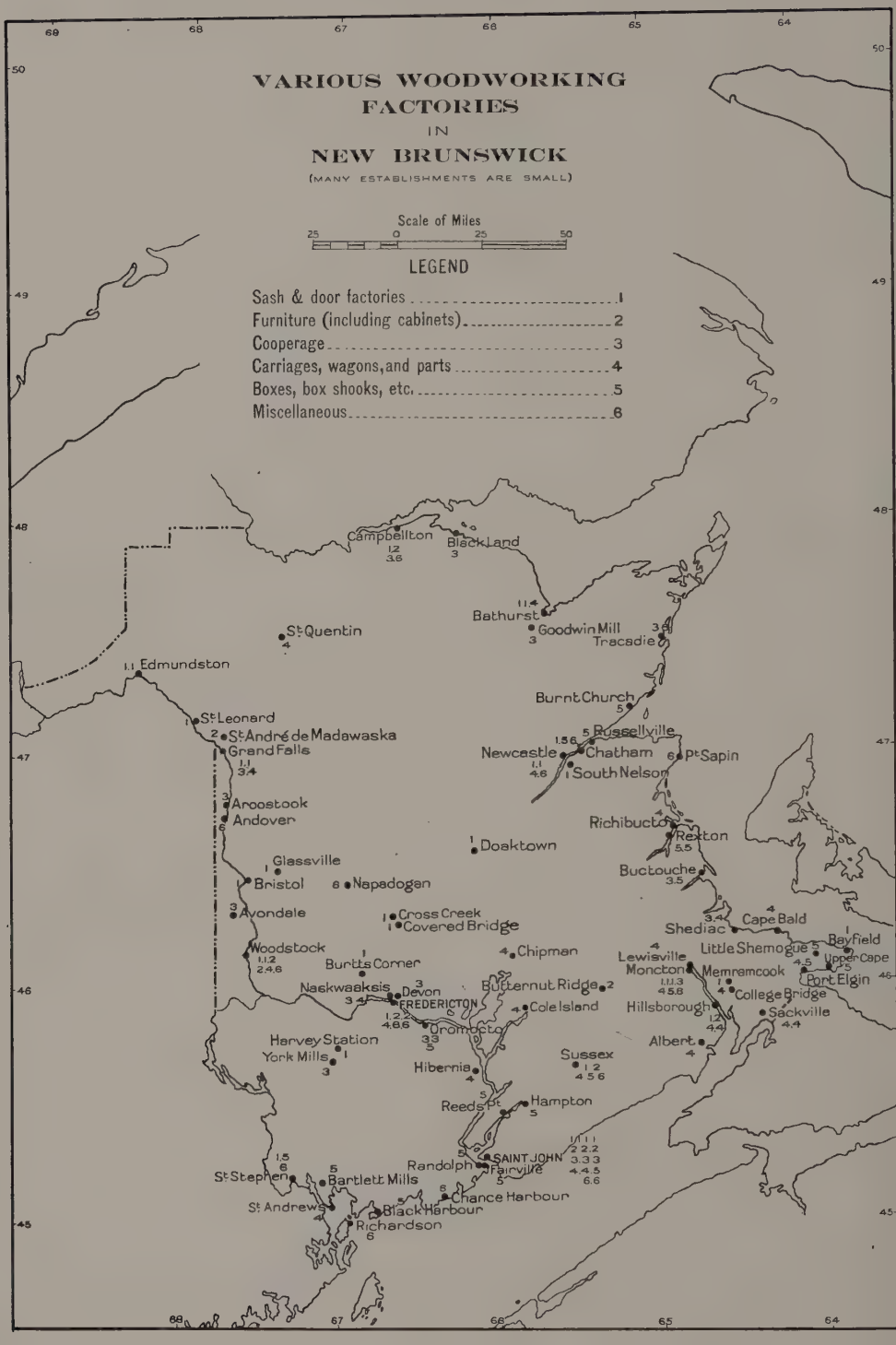
The market for spool wood in England is confined to the cotton district in the north and that for birch squares to the west and the midlands for use by wood turners, cabinet makers, brush manufacturers, and as dowels for Windsor chairs.

Although bobbins are made from locally grown beech, sycamore, ash, and elm, certain types require birch, and for these the Canadian wood is preferred and commands a slightly higher price than that from Finland and Sweden, the present principal sources of supply of both spool wood and birch squares. Expansion of trade in these commodities with the United Kingdom is contingent upon the ability of Canadian firms to ship products of good quality wood, specially dry and cut and shaped to conform to the demands of the trade, and laying them down, c.i.f., U. K. ports, at competitive prices. Canadian exports of spool wood in 1928 were valued at $642,963, against $331,843 in 1927.

By visiting various districts and collecting small orders to make up a large shipment a Canadian manufacturer through his representative may gain a foothold in the chair and other small furniture business of the United Kingdom.

LAST BLOCKS

The Imperial Institute Committee on British Timbers referred in their report to the difficulty experienced by the boot-last trade of Northampton, England, in obtaining adequate supplies of sugar maple. Much Canadian maple is exported to the United States, where it is kiln-dried, rough-turned, and shipped to the United Kingdom as American last blocks, which by virtue of their careful manufacture from high-quality material only, control the trade, despite the presence of French hornbeam selling at two-thirds the price of maple.


VARIOUS WOODWORKING FACTORIES
IN
NEW BRUNSWICK
(MANY ESTABLISHMENTS ARE SMALL)
Scale of Miles
25 0 25 50
LEGEND
Sash & door factories 1
Furniture (including cabinets) 2
Cooperage 3
Carriages, wagons, and parts 4
Boxes, box shooks, etc. 5
Miscellaneous 6
Campbellton
Black Land
Bathurst
Goodwin Mill
Tracadie
St Quentin
Edmundston
St Leonard
St André de Madawaska
Grand Falls
Aroostook
Andover
Glassville
Bristol
Napadogan
Avondale
Cross Creek
Covered Bridge
Woodstock
Burtts Corner
Chipman
Naskwaaksis
Devon
FREDERICTON
Butternut Ridge
Cole Island
Oromocto
Harvey Station
York Mills
Hibernia
Sussex
Reeds Pt
Hampton
SAINT JOHN
Fairville
Randolph
St Stephen
Bartlett Mills
Chance Harbour
St Andrews
Black Harbour
Richardson
Burnt Church
Russellville
Newcastle
Chatham
Pt Sapin
South Nelson
Richibucto
Rexton
Doaktown
Buctouche
Shediac
Cape Bald
Bayfield
Upper Cape
Port Elgin
Little Shemogue
Lewisville
Moncton
Memramcook
College Bridge
Hillsborough
Sackville
Albert

The reason that Canadian firms have not a larger share in the English market is probably because the work of turning and kiln-drying, which requires knowledge and experience, has been in the hands of more or less unskilled labour; another factor has been the occasional use of dark or yellow-streaked maple. Neither wood of this nature nor careless workmanship will be tolerated by English importers.

Having ample supplies of maple New Brunswick firms should be in a position to derive greater profit by manufacturing to a greater extent the finished article instead of having the raw material fabricated in the United States and shipped from there. The new mill recently erected near Napadogan in York county should add materially to the province's output not only of last blocks but also of additional hardwood products such as chair bottoms, legs, and other small articles of furniture, the manufacture of which will reduce the wood wasted to a minimum.

CLOTHES PINS, BROOM HANDLES

Ordinary wooden clothes pins, $4\frac{1}{2}$ inches long and made from white hardwood smoothly finished, constitute one of the most important of all miscellaneous wood manufactures exported from Canada to New Zealand. That country consumes $20,000 worth a year. The pins should be packed in light wooden boxes, each containing 5 gross, and shipments made at monthly intervals from Atlantic or Pacific ports. In November, 1928, quotations to New Zealand importers ranged from 80 to 85 cents per box of five gross, f.o.b., Canadian ports. Canada and other British countries have the benefit of preferential tariff rates. For the cheaper grades of clothes pins a market prevails in the West Indies, Mexico, and South America.

United States firms have been able in the last 2 years to compete satisfactorily with Swedish birch clothes pegs in the north of England. American pegs in lots of 1,500 boxes sell, c.i.f., U. K. ports, at about 90 cents per five-gross box, less 5 per cent trade and $2\frac{1}{2}$ per cent cash discount respectively.

Canadian made broom handles, clothes pegs and other small woodenware are commonly shipped indirectly via New

York and other ports of the United States, thus depriving Canadian firms of the greater profit which should result from direct shipments.

Prior to the war the quality of such products as broom handles, washboards, clothes pegs, sanitary seats, was primarily considered in the United Kingdom; to-day, however, inferior but cheaper products from Germany, Sweden, and other continental countries seem to have the bulk of the trade.

The Irish Free State appears to offer a market for Canadian broom handles and broom handle squares, chiefly the latter—which are not dutiable. The Department of Trade and Commerce recently received inquiries from Dublin for birch, hemlock, and maple squares suitable for turning handles 1 inch and $1\frac{1}{16}$ inch by 50 inches, and 1 inch by 39 inches. The wood had to be of good quality, clean, free from knots, and well seasoned—preferably kiln dried.

The question of an agency arrangement is one which needs to be carefully considered by those Canadian firms determined to secure and maintain a profitable export business.

The possibilities for sharing to a greater extent in the Canadian market for broom handles and clothes pins should not be overlooked by New Brunswick concerns. According to the Maritime Trade Commissioner these products as well as wooden pails, blind rollers, turned tops as children's toys, basket bottoms, and other small dimension hardwood have been in demand, especially in Ontario.

TOOL HANDLES

The difficulty in securing hickory and its rapidly increasing price have made United Kingdom importers of tool handles look to Canada as a source of wood; and in this connection New Brunswick's supplies of rock maple, yellow birch, and white ash—although this last exists in comparatively small quantity—should be a decidedly favourable factor in any efforts which may be made by local concerns to increase the manufacture of certain tool handles for the purpose of catering to the British market.

The West Indies, Newfoundland, Argentine, Australia, New Zealand, and various parts of Canada including the

Maritime Provinces themselves provide markets for New Brunswick tool handles, Ontario in particular showing keen interest in pitchfork and shovel handles.

MISCELLANEOUS ARTICLES

The manufacture, perhaps, in New Brunswick of other minor hardwood products such as shoe-shanks, skis, ready-made doors, hockey sticks, snow shoes, banana crates could be satisfactorily initiated or extended, as the case might be, but, first, a careful investigation would have to be made to determine the requirements of the trade for which the respective products are intended and the price at which similar or substitute articles made in other countries sell in the competitive markets.

WOODEN SHANKS

Italy has no factory making wooden shanks and buys supplies from Canada, France, Germany, and the United States, the product from the first or last named country being preferred. Late in 1928 a large Italian firm, using 15,000,000 pieces a year, was inquiring for the Canadian curved and extra-curved shank, which is well liked, the ordinary-curved continental product being used exclusively for low-heeled boots and shoes. The metal shank is not in demand as it is too expensive.

SKIS

Skiing in Canada is yearly gaining in popularity and now claims some 50,000 enthusiasts, who until recently were dependent largely upon skis imported from the United States and Scandinavia. The species of wood in general use are, in order of importance, hickory, ash, birch, maple, and pine, the first two being used in the better and more expensive grades of skis. Canadian manufacturers are protected by a duty of 25 per cent ad valorem and made 24,768 pairs in 1927, against 13,616 pairs in 1926, to which New Brunswick's contribution was negligible.

READY-MADE DOORS

In 1927 Great Britain imported, mainly from the United States and Sweden, 1,700,000 ready-made doors. Although Canadian firms have difficulty in meeting the export prices quoted by American manufacturers of doors

made of Douglas fir, those in the Maritimes might be able to share in the growing market in England for lower-grade doors.

PEG WOOD

The large supplies of birch in New Brunswick warrant greater consideration being given to the export of peg wood to European manufacturers of boots and shoes, an industry which has expanded rapidly, especially in Italy, during the last few years.

PIANO WOODS

Piano keyboards of basswood (4 feet to 4 feet 2 inches in width, by 14 inches to 18 inches in length); spruce sounding boards (4 feet square); and key rails of hard maple shipped in the rough in sets, each of which consists of 2 pieces, viz., 4 feet 2 inches long by 1 inch thick by $3\frac{1}{2}$ inches wide and 4 feet 2 inches by $1\frac{1}{4}$ inches by 2 inches respectively, were exported prior to the war in appreciable quantity from Canada to England, particularly the London district, but since then the United States and other foreign countries have captured the trade with England.

WOODEN CAPS

Wooden caps made from maple or ash are used for manufacturing a type of fine metal brush used by jewelry manufacturers, but it is doubtful whether England, which now obtains her supplies from Latvian sources, would consider purchasing elsewhere unless the quality was most satisfactory and there was an advantage in price.

CRATES

The new arrangement that came into effect on May 1, 1929, whereby bananas entering Canada were exempted from duty if shipped direct to Canadian ports from the West Indies, should benefit firms in New Brunswick in a position to supply hardwood material for the crates used in transporting this fruit by rail from the port of landing. This business is not one which should be overlooked, for a firm as far remote even as northern Europe, has long enjoyed, so it is understood, a by no means unprofitable trade in the market for such material on this side of the Atlantic.

FOREST FIRE PREVENTION

Since the passing of the Forest Fires Act in 1918 increasing attention has been given to the protection of the forests from fires. The number of fires in 1918 was 850 compared with 107 in 1928, the lowest ever recorded, the damage in the former year amounting to $72,266 and in the latter to $4,673.

But despite the marked improvement since 1923 when New Brunswick experienced one of the worst fire-years in its history, the prevention of forest fires is still the greatest problem connected with forest administration and until it has been satisfactorily solved intensive forestry practice cannot logically be put into effect. The county of Westmorland has perhaps the most advanced legislation in Canada for forest fire prevention, and efforts are being made to encourage other counties to inaugurate similar policies.

The governmental legislation now in force covers various phases of forest fire protection, such as maintenance of a Forest Service consisting of inspectors, rangers and wardens; a close season when brush and débris can be burnt only under permit; compulsory destruction of débris in hazardous areas; prohibition of forest travel in certain areas during unusually dry weather; provision for registration of all persons entering the forests at certain seasons; purchase of suitable fire-fighting equipment and the establishment of permanent improvements. To impress the public an educational campaign is regularly conducted through the newspapers, schools, churches, and by means of motion pictures, radio addresses, and travelling lecturers.

Twenty-two primary look-out towers in various parts of the province will be in operation during 1929 and others are in course of erection; many of these are constructed of steel and all are adequately connected with telephone lines and manned by experienced observers engaged throughout the dangerous period. Many licensees and private companies equip and maintain towers and supplement in other ways the work of the provincial Government.

Fire-fighting equipment, including 24 portable gasoline pumps, is stationed at strategical points and 1,300 wardens are available throughout the season if required.

Upon the preservation of the forests depend the preservation of the water supply for hydro-electric developments, the existence of the fish and game, the maintenance of that scenic beauty with which New Brunswick is so greatly endowed, and the development of the tourist trade. The forests constitute perhaps the most important factor in the economic life of the province.

SYNOPSIS OF TIMBER REGULATIONS

In 1913 existing leases were extended and new licences issued, viz., saw-mill licences for twenty years and pulp and paper licences for thirty years, which carried extension privileges of ten and twenty years respectively.

In 1927 provision was made for the issuance of pulp and paper licences for fifty years to persons or companies undertaking to establish pulp and paper plants within the province, or to enlarge the capacity of mills within a certain period. A saw-mill licence for thirty years was also provided for. Pre-existing leases could be surrendered for the new leases.

Leased land is subject to an annual rental of $8 per square mile, a fire-protection tax of one-half cent per acre, and the bonus payable in instalments in accordance with the Act of 1913. This bonus varied from $20 to $100 a square mile in the case of saw-mill licences and up to $130 a square mile for pulp and paper licences. In addition the licensee is subject to the stumpage rate and timber regulations in force on August 1 of each year.

The stumpage rates for 1928-29 were:—

Spruce, balsam fir, pine, hackmatack, and cedar saw logs	$3.00	per M superficial feet
Spruce and balsam fir logs (for pulpwood)	3.50	" "
Hemlock logs	2.50	" "
Hardwood logs	2.00	" "
Poplar and hardwood (for pulpwood)	0.90	per cord
White birch spoolwood	2.00	per M superficial feet
Pine, cedar, and hemlock railway ties, 8 feet long	0.12	each
Poles (telegraph), 20 to 29 feet	0.02	per lineal foot
Poles " 30 to 39 feet	0.025	"
Poles " 40 feet and greater	0.03	"
Timber (piling), 20 to 29 feet	0.02	"
Timber " 30 to 39 feet	0.03	"
Timber " 40 feet and greater	0.05	"
Hardwood (fuelwood)	0.60	per cord

No sound spruce, red or white pine can be cut which has a diameter less than 12 inches, measured inside the bark at a point not less than 12 inches from the ground. The diameter limits for jack pine and for yellow birch are respectively 10 and 14 inches. Special permits imposing upon the licensee certain conditions leading to the close utilization of the timber and allowing him to cut to smaller dimensions may be issued by the Minister of Lands and Mines if it is considered good forestry practice so to do.

The maximum stump height allowed is 16 inches from the ground, regardless of snow conditions.

Application for not less than 2 square miles and not more than 10 square miles of undisposed of Crown lands must be made to the Minister of Lands and Mines, accompanied by a deposit of $20 per square mile. Each application is advertised for two weeks in the *Royal Gazette* after which the timber licence is sold at public auction. Such leased land is subject to the renewal and other charges already referred to.

All logs, timber, except poplar, cut from Crown lands must be manufactured within Canada into merchantable pulp or paper, or into sawn lumber, wooden utensils, or other articles of commerce.

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FUR-BEARING ANIMALS

THE conditions that enable New Brunswick's fur bearing animals to thrive in the wild state are alike favourable to the raising of these animals in captivity, as is attested to by the many fox ranches—which have proved so remunerative that attention is being given also to the raising of muskrats and other furry species on a similarly extensive scale, for which purpose the requisite type of well-watered and wooded land can be found and procured almost anywhere

Fox Farm Near Saint John

in New Brunswick. Application for leases of such land should be made to the Department of Lands and Mines, Fredericton.

Inclusive of those with only two adult foxes there are now (August, 1929) at least 1,000 fur farms in the province having a total property value of about $5,000,000. The number of individual farmers interested in the raising of fur-bearing animals has increased in the last few years to such an extent that the provincial Government with the object of encouraging them removed late in 1927 the

royalty on animals bred in captivity, and in 1929 appointed an inspector and a veterinarian to visit the farms and give on the spot practical and scientific advice to all those who are engaged in or who contemplate fur-farming, thereby ensuring the development of the industry along the soundest possible lines. This type of aid—which New Brunswick is the first province to apply—supplemented by the information available from the research conducted in other provinces and by the federal Government at the fox experimental farm, Charlottetown, Prince Edward Island, should prove extremely beneficial in enabling the farmers to solve their fox-breeding problems.

The total number of animals on the farms is at least 25,000, most of which are silver-black foxes. Comparatively little attention has been given as yet to other animals, although some beaver and a few each of six or seven other species have recently been raised in domesticity, the climate and topographical features proving ideal for the purpose.

Among the animals taken in the wild state there has lately been a falling off in the number of otter, marten, mink, fisher, and red fox; but the sanctuaries established by the provincial Government will prevent it is hoped any further diminution in this respect. Beavers are still under protection. The numbers and kinds of wild fur-bearers killed in 1928 and 1927 and the royalty collected in 1928 from the 42,000 pelts stamped by governmental officials were as follows:—

	Number		Royalty collected, 1928[1]
	1928[1]	1927[1]	
			$
Weasel	19,912	24,961	995·60
Muskrat	13,856	11,498	679·30
Skunk	2,488	2,290	248·80
Red foxes	1,766	2,978	1,324·50
Mink	1,675	1,977	670·00
Raccoon	1,632	2,110	244·80
Bear	225	115	135·00
Crossed and damaged foxes	192	62	100·00
Marten	70	110	70·00
Otter	58	67	87·00
Fisher	26	49	52·00
Rabbits	23	8	1·05
Lynx	1	2	0·50
			$4,608·55

[1] Year ending October 31.

After deducting stampers' commissions the revenue derived from the royalty on fur was $4,215.58 against $7,974.11 in 1927 when the royalty on ranch foxes was still in effect, and from pelt, hide, and taxidermist licences, $2,326. According to the records of the Dominion Bureau of Statistics the pelts of wild and ranch animals killed in the season of 1927-28 realized $435,027; and the three principal establishments engaged in the making of fur goods had a total invested capital of about $90,000 and turned out products valued at $45,000 in 1927.

MINERALS[1]

NEW BRUNSWICK has long relied almost entirely upon her agricultural lands, forests and fisheries as principal sources of wealth, and although recently serious consideration has at length been given to some of the metallic mineral occurrences in those districts that were partially prospected in the past, definite geological information is still lacking over wide areas not yet scratched by the pick. Heretofore the non-metallic products coal, gypsum, natural gas and oil, limestone, granite and sandstone have been the mainstay of the province's mineral output, but it is confidently expected, in view of the radical improvements made two years ago in the mining laws, that prospecting will be energetically pursued and metallic ore bodies of commercial value eventually discovered. In the year ending October 31, 1928, 134 prospecting licences were issued compared with 48 in the preceding year.

GEOLOGY

Much of the detailed geology of New Brunswick remains yet to be accomplished. The outstanding features in so far as known have been approximately indicated on the map (p. 87), and the following few supplementary notes are based upon Young's report:—[2]

In northwestern New Brunswick is a plateau-like district over 1,000 feet high but deeply river-trenched, bordering which on the southeast are ridges and hills 2,000 to 2,500 feet high and sometimes much higher. Further southeast is a lowland which is nowhere 600 feet above sea-level and which forms the whole east coast of New Brunswick and extends convergingly almost across the province. On the south this lowland is broken by ridges, the most southerly of which rises abruptly from the bay of Fundy to a broad, flat top over 1,000 feet high.

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[1] Revised by the Department of Mines, Ottawa, and by the Department of Lands and Mines, Fredericton.

[2] Young, G. A., "Geology and Economic Minerals of Canada"; Geol. Surv., Can., 1926.

This extensive lowland, except in its southern and northwestern edges, is occupied by a series of almost horizontal sandstones and shales of Pennsylvanian age. Near Moncton is an assemblage of Mississipian beds, the lower part of which consists of 6,000 feet or more of shale and sandstone with a thick basal conglomerate. Further south the assemblage has a maximum thickness of about 700 feet, while in the Minto coal basin in the west of the lowland region it is about 500 feet. North of Moncton the Pennsylvanian strata carry thin coal seams, as is also the case in the extreme north along Chaleur bay where the series overlies coloured sandstones and shales at least 1,000 feet thick.

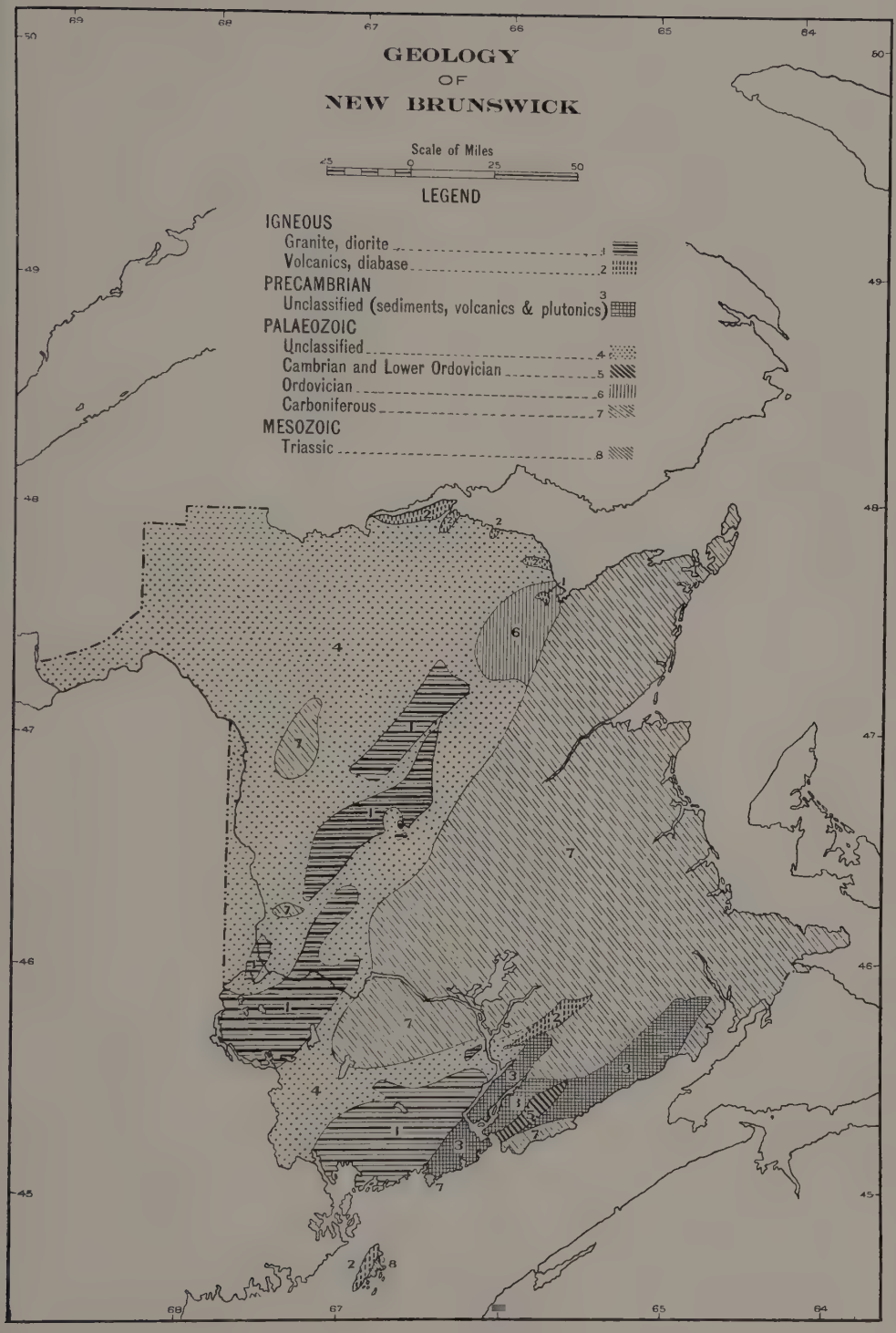
In central New Brunswick various assemblages of deformed sediments and volcanics and of gneissic and schistose rocks have been regarded as being of Precambrian age but some of these are metamorphosed Palaeozoic strata and perhaps all are of this age.

In the uplands along the bay of Fundy occur areas of crystalline limestone, quartzite, and gneiss of Precambrian age. Elsewhere in these uplands and the parallel ridges to the north are extensive developments of volcanic strata which, with various intrusive bodies, may also belong to the Precambrian system.

Middle and upper Cambrian beds occur near Saint John. The strata consist of several thousand feet of folded and faulted fossiliferous shales with sandy interbeds; they are conformably underlain by greatly varying thicknesses of red and green shales and sandstone reposing on early Precambrian strata. They pass up into fossiliferous strata of earliest Ordovician age.

Near Bathurst occur closely folded, fossiliferous, dark slates and thin, arenaceous beds of Trenton or of somewhat earlier age associated with a thick group of coarser detrital strata and with an assemblage of tuffs and both acid and basic intrusives and extrusives, all presumably of Ordovician age. Extending southwesterly from this locality is a wide belt of sedimentary strata, perhaps also largely of Ordovician age, associated in places with igneous rocks.

Silurian and Devonian strata are extensively developed in the northwesterly parts of the province and are associated in places with large volumes of acid and basic flows and tuffs. Silurian beds similarly occur along the south


GEOLOGY
OF
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
IGNEOUS
Granite, diorite 1
Volcanics, diabase 2
PRECAMBRIAN
Unclassified (sediments, volcanics & plutonics) 3
PALAEOZOIC
Unclassified 4
Cambrian and Lower Ordovician 5
Ordovician 6
Carboniferous 7
MESOZOIC
Triassic 8
69
68
67
66
65
64
50
49
48
47
46
45

shore of Chaleur bay and probably among the folded sediments extending southwesterly through central New Brunswick to the bay of Fundy shore where they have been definitely recognized.

Triassic beds consisting of reddish conglomerate, sandstone and shale occur in a few isolated patches along the bay of Fundy where the Pennsylvanian strata are tilted and bounded by faults along their northwest sides.

ECONOMIC GEOLOGY

The resources of coal, gypsum, natural gas and petroleum, limestone and sandstone, provide the bulk of the mineral output. With the exception of a small amount of bog manganese there is no present contribution from the metallic mineral occurrences, the more important of which, however, are dealt with to present in true perspective the extent of the province's mineralization. The value of the minerals produced in 1928 was $2,198,919, compared with $2,148,535 and $1,811,104 in 1927 and 1926 respectively.

Non-metallic Minerals

COAL

In the calendar years 1927 and 1928 the province's production, imports and exports of coal in short tons, as given by the Dominion Bureau of Statistics, were:—

——	1927	1928	
Output (all bituminous)	203,950	207,738	
Imports—			
(1) Bituminous	565,350	450,993	(*a*)
(2) Anthracite	101,660	73,676	(*b*)
Exports (all bituminous)	64,437	25,841	(*c*)
Consumption—			
(1) Bituminous	704,863	632,890	
(2) Anthracite	101,660	73,676	

(*a*) Comprises 400,426 tons of Canadian coal from other provinces (Nova Scotia, almost entirely), 49,484 tons from the United States, and 1,083 tons from Great Britain.

(*b*) Comprises 39,615 tons from the United States and 34,061 tons from Great Britain.

(*c*) Mostly imported bituminous coal.

Although bituminous coal is found and thin seams are exposed in many parts of the Carboniferous, the domestic output has been for years derived almost entirely from the

Minto area, where the actual, probable, and possible coal reserves amount to about 233,000,000 tons. Beersville in Kent county was at one time the centre of a small mining industry operating an 18 inch seam, as also was Dunsinane in Kings county, the combined coal reserves in these two areas being placed at 13,000,000 tons.

MINTO COAL BASIN[1]

The Minto coal basin covers an area of about 400 square miles near the head of Grand lake. The coal is mined by shafts and underground working and, where the overburden is 15 to 20 feet, by stripping. It is all taken from one seam which can be found over nearly all parts of the basin. This seam, which is thin and lies near the surface over large areas, has its greatest thickness in the southwestern part of the basin, in the vicinity of Minto and Eighteen creek, where it averages about 24 inches and is fairly uniform in composition. Near South Minto village the thicker parts of the seam are practically worked out and operations have been transferred to North Minto and to the land between Newcastle creek and the village of Newcastle Bridge. Transference of temporary workings, which is occasionally necessary in this coal basin, adds materially to the otherwise low cost of mining. West of Minto and about two miles south of Scale station the mining of a 24 inch seam was begun in 1927, since when much coal has been produced for use in the pulp plant near Saint John.

The leading companies operating near Minto hold reserve lands near Eighteen creek. About one mile up this creek from its junction with Little river, 25 inches of coal could be recovered from a seam measured at this point. The overburden is not more than 50 feet and the distance from the railway only one mile. As yet, however, no mining has been done.

Not much information appears to be available about the coal known to exist at a number of places—notably near Grand lake and the Salmon river—east and southeast of the small area of $2\frac{1}{2}$ miles radius around Minto station, where mining is at present largely centred. In some of

[1]Dyer, W. S., "Minto Coal Basin, New Brunswick", Geol. Surv., Can., Memoir 151.

these places either transportation facilities are lacking or the seams are too thin to be operated profitably under present conditions. The old Elkin mine, however, 3 miles south of Chipman, from which much coal was recovered twenty years ago, has been actively worked since it was reopened early in 1927. The seam at this spot is 18 to 20 inches and the overburden about 20 feet.

QUALITY OF MINTO COAL

Minto coal is an average bituminous variety, low in moisture, fairly high in calorific value, and possessing good coking properties, but is high in ash and sulphur. From the point of view of handling, friability, and the extent of fines it is inferior to the better grades of coal in Nova Scotia. The screened lump coal, however, makes a good steam coal, and the leading operating company is screening and sorting much of its output, particularly that for use by the railway companies.

Coke from unwashed Minto coal is high in ash and sulphur, whilst that from the washed coal is 40 per cent lower in ash. By coking washed Minto coal with a low ash bituminous coal a good grade of fuel can be obtained having an ash content of less than 13 per cent, but it is still too high in sulphur for use as a metallurgical coke, although low enough to permit its being classed as a very satisfactory domestic fuel.

The coal from the vicinity of Eighteen creek appears from some analyses to be much better in quality than that from Minto and to compare favourably with the best grades of Nova Scotia coals.

MARKETS

Almost all the output is marketed within the province; about 70 per cent is sold to the railway companies, the balance largely to manufacturing plants, of which some demand slack coal. Appreciable amounts are used satisfactorily for heating buildings by steam or by hot air furnaces that have been adapted to the burning of soft coal. A pulp company near Saint John which formerly depended entirely upon Nova Scotia coal began last year

using 2,250 tons monthly of Minto coal from its own colliery and has obtained remarkably high-firing efficiency at low cost by first pulverizing the fuel. Similar procedure in other industrial plants of the province is worthy of serious consideration if only from the point of view of economic practice, and when effected will result in a material increase in the domestic coal consumption.

Except for a shipment of 354·90 tons by the leading company at Minto, exports of New Brunswick coal to the United States were negligible in 1927, whereas prior to the enactment of the Fordney tariff an appreciable percentage of the domestic production was shipped across the international boundary.

The shorter haul enjoyed by Minto coal over Nova Scotia coal in shipments by rail to points west of the Maritimes may be a factor in extending the market under the temporary provision made by the federal Government for a maximum rate of $2.10 on such coal transported wholly by rail to points in Quebec, where the United States has had heretofore competitive advantage. This provision is only applicable, however, when the St. Lawrence is closed to navigation in the four months periods, December 15 to April 15, occurring between March 30, 1928 and March 30, 1931.

Minto coal can be used as already stated to make a good domestic fuel to take the place of imported anthracite. It might be advisable, therefore, to give consideration not only to the installation of coking plants in one or more of the province's industrialized areas but also to the possibility of shipping Minto coal to existing plants and others that may be erected in Ontario and Quebec to coke Canadian coal. To assist in the production of a domestic fuel the federal Government grants an annual subsidy during a period not exceeding fifteen years of 4 per cent of the cost of by-product coking plants erected by private corporations, and of 5 per cent in the case of municipal-owned plants. The full subsidy cannot be earned unless 70 per cent of the coal used is of Canadian origin.

Some attention has lately been given to the question of utilizing Minto coal in the generation of electricity at the pit mouth.

GYPSUM

Except for a small gypsiferous area in Victoria county all the gypsum so far found lies in Albert, Westmorland, Kings, and St. John counties. The only deposits which have been extensively worked are in Albert county, the known occurrences elsewhere never having been properly developed despite the fact that the larger among them appear to warrant systematic prospecting with the core drill in order to determine the quality of the material below the surface outcrops.

The provincial output of crude gypsum in 1928 was 75,033 tons, compared with 85,293 in 1927, and is derived almost entirely from the valuable deposits in the vicinity of Hillsborough. The product of this district is noted for its purity, and large quantities of white alabaster have been found from time to time and mined. The total gypsiferous area is supposed to be about 14 square miles, but the area of the actual outcrops where the principal quarries and mines are being operated is only $1\frac{1}{2}$ square miles. The plant of the operating company has a daily capacity of 500 tons and is equipped with modern machinery for the milling and calcining of gypsum.

Unlike the Hillsborough gypsum that near Plaster Rock is impure, varying in colour from a dark reddish-brown to a light green, but is not associated with anhydrite. It has been quarried intermittently for many years for use as a fertilizer and, more recently, as a retarder in cement manufacture. Last year 400 tons were crushed and used as a successful fertilizing agent for potatoes.

A few details, taken largely from Cole's report,[1] regarding some of the other gypsum occurrences follow:—

Curryville, Albert County

For a number of years the deposits, now idle though by no means exhausted, at the headwaters of Demoiselle and Wilson creeks have been mined and quarried, yielding a good grade of gypsum which was shipped in the crude form to the United States.

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[1] Cole, L. H., "Gypsum in Canada" (1915), Mines Branch, Dept. of Mines, Canada. A new report is in course of preparation.

Petitcodiac, Westmorland County

About $2\frac{1}{2}$ miles northwest of Petitcodiac station is a gypsiferous area somewhat similar to that near Hillsborough. Along Fawcett brook the deposit can be traced by surface outcrops for $2\frac{1}{2}$ miles, the average width being 600 feet. The gypsum is greyish and associated with selenite, for which reason what little has been quarried has been used for land plaster. A white gypsum can be obtained from several of the outcrops, but as little development work has been done it is impossible to ascertain the

Train at Hillsborough Quarries Loaded with Gypsum

suitability of the material for wall plaster and other products. A property in this area is said to be under investigation at present (February, 1929) by Toronto interests.

Upham, Kings County

South of Upham station a few outcrops occur, from one of which small quantities of gypsum were quarried in 1907 and shipped to Saint John. Systematic examination of this area might reveal an important deposit.

Kings County, Generally

Several deposits occur, the more important of which are known as the Apohaqui, Mount Pisgah, and the Smith Creek deposits, but definite data about them are not available.

Hopewell Cape, Albert County

The gypsum here has a heavy overburden of soil and millstone grit, and only a small amount of prospecting has been done to determine its quality and extent. About 200 tons of massive gypsum of good quality were quarried some years ago.

Cape Maringouin, Westmorland County

For quite a distance along the shore of the south-western peninsula of Westmorland county a gypsiferous area is exposed, from which small amounts of gypsum have occasionally been quarried for shipment in the crude state. The gypsum, which occurs with anhydrite, varies in colour from white to pink and grey; it is mostly massive, although small quantities of coarse granules can be noticed in several places.

PROGRESS IN THE INDUSTRY

Not many years ago a small proportion only of the gypsum mined in New Brunswick was calcined. Today about 45 per cent of the rock annually taken from the Hillsborough deposits is so treated and made into one or other of such products as terra alba, wall plasters, dental plaster, plaster of paris, and, latterly, a type of Keene's cement which is meeting with much success. The remaining 55 per cent is largely exported as crude, principally to the New England States.

Although the Canadian market is the main outlet for the manufactured gypsum produced in New Brunswick, progress has been made in the markets of the United States, Australia, New Zealand, and South Africa, and to some slight extent in those of the West Indies and Japan. This trade will no doubt increase and perhaps will be extended—for there seems no reason why it should not be—to the republics of Central and South America. To the 15 car-

loads of gypsum monthly imported by Cuba, Canada's contribution is negligible, the United States being the largest supplier until recently when strenuous competition has been coming from Germany, France and Belgium.

NATURAL GAS AND OIL

The province's production of natural gas and oil comes from the Stoney Creek field near Moncton, where 80 wells have been drilled. This field has been so systematically tested and developed that borings for a number of years have been confined largely to the deepening of old wells in order to reach the proven lower gas-bearing horizons. In 1928 five old wells were cleaned, three were deepened, and four new wells were sunk, resulting in an addition of 4,000,000 cubic feet of gas. The output during the last three years has been:—

——	1926	1927	1928
Natural gas (M cu. ft.).....	648,316	630,755	660,981
Petroleum (barrels of 35 imperial gals.).	10,544	18,244[1]	8,043

[1] This comparatively large output was partially accounted for by the company's pumping its wells for a capacity test.

The gas which is free from sulphur, of high-heating value, and a very cheap source of power to industrial concerns is disposed of in Moncton, Hillsborough and vicinity, whilst the crude oil is either sold locally or, at times when stocks have accumulated, to the Imperial Oil Company at Halifax. As the oil produces a high grade lubricant, the question of a local refinery for the economic disposal of the capacity-output of the wells has latterly been given much thought.

The exclusive rights to extract oil and gas in all that territory, with the exception of the counties of York, St. John, and Charlotte, lying southeast of a line joining Bathurst to the mouth of Porter's brook above Boiestown belong to one company until the year 2006. This territory has an area of about 10,000 square miles. What drilling has been done outside the Stoney Creek field has not been encouraging. Wells were drilled ten years ago at Port

Elgin, Buctouche, and Coal Branch to depths of 3,251, 2,450, and 1,810 feet respectively, but neither oil nor gas was obtained.

LIMESTONE

The producing limestone quarries and lime plants are near Saint John, where and northeast therefrom occurs the province's most extensive area of Precambrian limestones, the exposures having a maximum width of $1\frac{1}{2}$ miles and extending 15 miles. In 1928 the output of lime was 11,261 tons, compared with 12,009 tons in 1927. Lump lime, limestone for pulp making, and pulverized limestone for agricultural purposes, are all produced in this area, but no building stone, except perhaps occasionally as a side line; at Brookville is the grinding plant established by the New Brunswick Government. Samples representative of the pure stone from 4 high calcium quarries analyzed[1] about 95 per cent calcium carbonate, and from 2 white dolomite quarries about 41 per cent magnesium carbonate, the content of oxides of iron and aluminium ranging from 0·16 to 0·82 per cent. The new plant established early in 1929 at Saint John treats both high calcium and dolomitic limestones. The lime product is packed in 50 pound paper bags and used in pulp and paper mills, sugar refineries, steel mills, tanneries, for spraying orchards, in the canned milk trade, and largely, of course, in the building industry as a wall coating. The magnesian lime, though also used for this last purpose, is sold mainly to certain pulp mill operators.

Silurian rocks underlie the greater part of Restigouche and Madawaska counties, but they have never been properly investigated. They extend down the valley of the St. John river to near Woodstock, below which only isolated outcrops are found. About 10 miles east of Florenceville occur exposures indicative of a large deposit of high-calcium grey limestone, fine grained and semi-crystalline, which analysis shows to be quite pure. At the mouth of Passamaquoddy bay is a band of limestone one-third of a mile wide, which dips almost vertically, outcropping again on Frye's island where it is much narrower. Strata

[1] Goudge, M. F., "Investigations of Mineral Resources of the Mining Industry" (1926), Mines Branch, Dept. of Mines, Canada.

over widths of from 20 to 200 feet are composed of a highly crystalline, fine-grained, yellowish-white to blue limestone predominantly high-calcium in composition. In an easterly direction the deposit extends across l'Etang peninsula. Three main varieties of limestone occur in the deposit: *(a)* white to mottled white and grey marble, *(b)* dark greyish-weathering bedded limestone which underlies about 62 acres and constitutes the greatest part of the deposit, *(c)* interbedded argillite and grey limestone. These Silurian limestones, formerly a source of much lime, are now only occasionally used for the production of small amounts of ground limestone.

The limestones of the Carboniferous area are high in calcium but vary in appearance and purity in different districts. Exposures are numerous, particularly in Kings and Albert counties, those at Norton, Havelock, and Petitcodiac being perhaps the more important from the point of view of both quality and railroad proximity. The limestones at Havelock, where a crusher is operating, are extensive. Other promising deposits are found $2\frac{1}{2}$ miles north of Dorchester and at Queenstown, at which latter place the limestone has been altered to red marble. The only use, however, to which the province's Carboniferous limestone is now applied is agricultural.

The total output of limestone (inclusive of that used for lime-making) was 30,772 tons in 1928.

SANDSTONE

Sandstone for building purposes is found in the Miramichi, Sackville, Buctouche, Shediac, Shepody, and Chaleur bay areas. The Miramichi sandstones of the millstone grit are olive-green and the output of the quarries in the Quarryville district of Northumberland county, 17 miles southwesterly from Newcastle, is extensively used in the Maritime Provinces and has been shipped considerable distances outside New Brunswick. It is now being used in the construction of the Canadian National Railways new station and hotel at Halifax. The City Hall in Hamilton and the Langevin Block in Ottawa are illustrative of the use of this stone in important public buildings. The red stone of the Upper Carboniferous rocks near Sackville in

Westmorland county also enjoys a wide market, and has competed successfully with other structural stones on which transportation costs are lower, even in Ontario for buildings of the best type, such as the Observatory, Ottawa, and the Customs House, Waterloo.[1]

The provincial output of sandstone in 1928 was 10,075 tons.

Parliament Buildings, Fredericton, Built from Near-by Sandstone

PULPSTONES

The bulk of the pulpstones produced in Canada comes from the Miramichi quarries which have already been referred to under sandstone. Although some quarries in this area have long been abandoned those of the present large producing company have been in uninterrupted operation for almost twenty-five years. In the lower beds of this company's quarries the yellow-brown sandstone attains a thickness of 10 feet, but the presence of grit, mud cracks, and hard and soft spots makes difficult the quarrying of a stone as free as possible from flaws.

[1] Parks, W. A. "Building and Ornamental Stones", (Vol. II); Mines Branch, Dept. of Mines, Canada. No. 203.

The only other place in New Brunswick from which pulpstones are now produced is the thirty-year old but recently reopened quarry at Beaumont, Westmorland county, near the mouth of the Petitcodiac river, the operating company dressing the stones at Dorchester. Several years ago a soft slightly green sandstone which hardened considerably on seasoning was quarried near Shediac, the pulpstones produced comparing favourably with the imported.[1]

The province's output of pulpstones, grindstones, and scythestones during the years 1928 and 1927 was 1,609 and 1,860 tons respectively. Less than 10 per cent, however, of the 4,500 tons of pulpstones, valued at more than $500,000, annually used in the Dominion is of domestic origin despite the fact that New Brunswick is now shipping its product to Nova Scotia, Quebec, and as far west as Kenora. Many Canadian pulp mills have never even tried the stone. It would appear, therefore, that increased selling efforts combined with great care in the selection of stone for manufacture, rigid inspection during all stages of production, thorough seasoning of the stone, and shipment in well made crates would result in New Brunswick producers sharing to a greater extent in the domestic market, notwithstanding competition from the natural stone of England and the United States and from, possibly in the future, the artificial pulpstone.

GRINDSTONES AND SCYTHESTONES

The use of artificial grinding wheels has resulted in the demand for natural grindstones being limited largely to stones of more than 5 feet in diameter, and, furthermore, in view of the competition from quarries in Ohio and elsewhere in the United States the economic production of even this type of natural stone is only possible from quarries where the beds are thick, large, and uniform. Nevertheless, New Brunswick possesses in certain of its sandstones, particularly those at Stonehaven, a resource from which grindstones and scythestones of such good quality are made that Canada has been able to maintain part of the much larger market it enjoyed many years ago for these products.

[1] Eardley-Wilmot, V. L., "Siliceous Abrasives", Mines Branch, Dept. of Mines, Canada, No. 673

The Stonehaven quarry on the south shore of Chaleur bay and 18 miles from Bathurst has been in operation since 1863, and for more than 30 years has been the source of the bulk of Canada's output of grindstones; stones ranging in size from 8 inches to 7 feet in diameter being made to supply the various types demanded largely by farmers and manufacturers of files, saws, and machine knives. Some scythestones also are produced annually from a near-by ledge of very fine-grained blue sandstone.

A few grindstones are obtained from Quarryville, Northumberland county, and from Rockland, Westmorland county, but the quarries at Grindstone island have not been worked since 1850, the readily accessible stone along the shore having been removed, although a short distance inland along the strike of the old quarries on the opposite mainland a 50-foot cliff presents a good working site.[1]

GRANITE

Large areas of New Brunswick consist of granite admirably suited by grain and colour to structures and monuments, but they have never been developed to the extent the resources merit. Nevertheless St. George in Charlotte county is the centre of the most important granite-producing areas of the Maritimes. The red granite for which this district is particularly known is quarried largely from a section of a narrow belt north of the town and extending several miles east and west. This belt forms the southern edge of a much greater mass from which pink, salmon-coloured and grey stones are obtained. The output is almost all used for the making of monuments in local mills, where is also worked the medium-grained pink and grey granite from the Spoon island quarries (on the hillside to the west of the St. John river opposite Spoon island) as well as, occasionally, stone imported from Maine.

Near Bocabec, within a few miles of St. George, occurs the so-called black granite (in reality a diabase) from which highly-polished, handsome monuments are made. In quarrying this granite much material is wasted which doubtless could be used as a road metal. Consideration also has been given to the use of quarry-waste in a paving

[1] Eardley-Wilmot, V. L., "Siliceous Abrasives", Mines Branch, Dept. of Mines, Canada. No. 673.

stone industry, and for this purpose some quarries, such as those at Spoon island, are favourably situated for transporting this material by water. But as yet nothing practical along these lines has been undertaken.

A coarse grey granite extends northeasterly across York county from which much building stone has been produced in the vicinity of McAdam. Near St. Stephen is a similar granite which has been used for curb stones, and among other occurrences is the reddish granite exposed at many points near Bathurst.[1]

The provincial output of granite in 1928 was 5,485 tons.

CLAYS AND SHALES

The making of building brick represents largely the extent to which the clay resources of the province are now being applied. The surface clays at a number of places will produce probably as good a quality of common red brick as can be produced elsewhere in Canada from similar sources. The whole of the city of Fredericton is underlain by blue clay, whilst at Saint John are clay deposits almost as extensive and excellently suited for such products as brick, drain tile, and flower pots. Near Chatham are the marine clays of Nappan river, and near Bathurst highly plastic, red stratified clays. But the making of brick is at present confined largely to Saint John, Fredericton, St. Stephen, and Chipman. Red clay near St. Andrews is locally used to make small amounts of "Cottage Craft" art pottery, but the present manufacture at Saint John of stoneware and other heavy domestic pottery is based upon Nova Scotia and New Jersey clays. The output of all clay products had a value of $72,192 in 1928, compared with $87,185 in 1927.

Although no known commercial deposits of china clay or ball clay for procelain manufacture, or of true fireclay sufficiently refractory for the production of good fire brick occur in the province, there are certain shales of a type not found in either Quebec or Ontario which are suitable for the making of face-brick, sewer pipe and possibly stoneware. The best shale is found in the Minto coal-mining area. That which overlies the coal is uniform in colour and

[1] Parks, W. A., "Building and Ornamental Stones" (Vol. II); Mines Branch, Dept. of Mines, Canada. No. 203.

texture over several square miles; it weathers speedily, and when fresh, if finely pulverized and tempered with 16 per cent of water, works up to a good plastic mass which can be readily moulded in almost any type of clay-working machinery. The shale in some localities should be useful for making vitrified products.[1] In the latter part of 1928 was commenced the construction of a plant of 100 tons daily capacity at Chipman to use the near-by coal shales for the manufacture of hollow building tile and brick; this plant is at present operating.

Unlike the overlying shales, those underlying the coal vary widely, some being refractory enough to be classed as second-grade fire clays, others softening so readily that they cannot be used even for making vitrified ware. The clay underlying the coal at Flower Cove, on an inlet of Grand lake, is the most plastic and most refractory—fusing at cone 23 (2894° F.)—yet found in the Minto coal basin. It has the characteristics of a stoneware clay, and though having a rather high shrinkage could probably be used, if sufficient "grog" were added, to make stoneware, art pottery, yellow ware, architectural terra-cotta, electrical conduits, and sewer-pipe.

The shales in the Beersville and Dunsinane coal areas could also be used for making such clay products as pressed brick, dry-pressed brick, and, perhaps, paving brick.

OIL SHALES

Oil shales have a wide distribution in Albert and Westmorland counties, and the aggregate tonnage of commercial quality is known to be very large, but definite figures cannot yet be given as the extent of individual areas and the thickness of shales and overburden have not been completely determined.

The shales are of three kinds, plain, curly, and paper, and physically dissimilar from known deposits elsewhere in the world; they occur in the Albert series of Carboniferous rocks. This series is exposed at Albert Mines in Albert county over an area of about one square mile and outcrops in the Baltimore area at Rosevale in an east and west belt about 3 miles long and one-quarter of a mile wide.

[1] Keele, J., "Clay and Shale Deposits of New Brunswick"; Geol. Surv., Can., Memoir 44 (1914).

It is in this area around Albert Mines, Rosevale and Turtle Creek that interest in commercial development has centred in recent years, much exploratory and experimental work having been undertaken, involving the expenditure of large sums of money, but as yet there is no commercial production. Extensive geological and other studies, both in the field and in the laboratory, have also been carried out by officers of the federal Department of Mines.

In 1926 a company was organized to develop the Rosevale shales and erected in 1928 a retort plant of American origin close to the site of the Wallace retort which was operated in 1921 by a subsidiary of the Anglo-Persian company. The plant installation is said to have cost between $300,000 and $400,000 but is idle at present (August, 1929). The Rosevale shales are somewhat different in their physical character from those at Albert Mines and the horizontal beds are said to be much faulted.

In the north part of one company's extensive deposits of oil shales at Albert Mines the beds are more or less horizontal whilst in the south they are nearly vertical, the overburden being small in each area. It was in this southern section 80 years ago that albertite was discovered and very profitably mined for 30 years, the vertical vein at a depth of about 1,250 feet becoming, so it was claimed, cone-shaped and containing a mixture of albertite and shale.

The crude shale-oil is readily amenable to refining by the modern cracking processes in use in the petroleum industry. Tests conducted by the federal Department of Mines on shale-oil derived from Rosevale shale retorted by the Pritchard process showed volume yields as high as 60 per cent of good grade gasoline. The total yield of gasoline and fuel oil (which has a paraffin base and a low sulphur content) amounted to over 80 per cent of the crude shale-oil tested.

SALT AND POTASH

At a depth of 1,295 feet in a well drilled a few years ago in search of oil and gas at Gautreau, 8 miles southeast of Moncton, a bed of rock salt 485 feet thick was reached. Analyses of the chief samples from the churn drill indicated the presence of small quantities of potassium. In 1928

another well, 3,460 feet northwest of the former site, was sunk to determine the limits and dip of the salt bed, but this boring was proved to be outside the field. Although this is perhaps the first bed of salt discovered in the province brine springs have long been known, from some of which many years ago small quantities of salt were occasionally obtained. The best known of these are at Sussex, Salt-spring brook (about 30 miles south of Sussex), and on the Tobique river, but only at the first-named place has any effort ever been made to manufacture salt, and this was in the latter part of the last century when 150 barrels were annually produced for a few years. The salt was well suited to table and dairy purposes.[1]

DIATOMITE

Of the known deposits of diatomite, all of which occur in the south, the largest is that in Pollet lake, Kings county. The following details concerning this and other deposits, none of which is at present being mined, have been taken from Eardley-Wilmot's report.[2]

Pollet lake

Twelve miles south of Penobsquis station. Deposit variable. In places 2 feet of very dense, white, high-grade diatomite (82·62 per cent SiO_2, 5·43 per cent Al_2O_3, 0·67 per cent Fe_2O_3). Area 70 acres. Shallow lake, easy to drain. Deposit at one time operated and about ten car-lots shipped. One of the best diatomite deposits so far discovered in the province.

Flood lake

Sixteen miles southeast of Sussex. Two to eight feet of dark brown diatomite (60·00 per cent SiO_2, 0·94 per cent Fe_2O_3), but in places dense, white (82·56 per cent SiO_2, 0·50 per cent Fe_2O_3). Area about 10 acres. Good grade deposit worth investigating.

Stannard lake

Three miles southwest of Albert Mines. Deposit variable. In places 1 foot of good white (79·44 per cent

[1] Cole, L. H., "The Salt Deposits of Canada", Mines Branch, Dept. of Mines, Canada. No. 325. (1915).

[2] Eardley-Wilmot, V. L., "Diatomite, Its Occurrences, Preparation, and Uses"; Mines Branch, Dept. of Mines, Canada, No. 691. (1928).

SiO_2, 0·10 per cent Fe_2O_3), but mainly 3 to 5 feet of yellowish (63·08 per cent SiO_2, 0·94 per cent Fe_2O_3). Area about 7 acres. Shallow lake of about 11 acres and worthy of further investigation.

Fitzgerald lake

Eight miles east of Saint John. Four to nine feet of grey diatomite (70·50 per cent SiO_2, 2·10 per cent Fe_2O_3) Deposit very consistent in grade. Area 70 acres, drained thirty years ago. Was once operated and material calcined and shipped.

Long lake and McNair lake

These are minor deposits occurring 8 miles northwest of Saint John and near Pollet lake respectively.

PEAT

The more extensive of the many peat bogs in New Brunswick have been examined by A. Anrep of the Geological Survey, Department of Mines, and his investigations have revealed that they are potential sources for the manufacture of peat litter. Although this material is at present little used in New Brunswick and in fact in Canada generally, it finds extensive application in northern Europe as a stable litter and as a fertilizer ingredient. The peat mull which is the powdered by-product of peat litter manufacture serves as a packing material, an insulator, a garden mulch, an absorbent and deodorant, and, in admixture with refuse molasses from sugar refineries, as a food for live stock.

The best and largest of the bogs are in the counties of Northumberland, Kent, and Gloucester; many of them are well situated as regards marketing and shipping.

Peat fuel bogs on the other hand are scarce and usually too shallow or possessing certain disadvantages to warrant installation of mechanical plants for large-scale operation. The peat could be cut by hand, however, and used in the immediate vicinity as a domestic fuel. The Maugerville bog, for instance, about 4 miles southeast of Fredericton, contains fairly well-humified peat which could be so used.

As yet there is no commercial production of either peat fuel or peat litter in the province, but a company incorporated in February, 1929, is constructing a small plant on a 150-acre bog, a few miles from St. Stephen, and is expected to be producing both litter and mull for the Canadian market before the end of the year.

The following table gives a few particulars regarding some of the bogs:—

Peat bog	County	Approximate area acres	Estimated possible production of fuel with 25% moisture	Estimated possible production of litter with 20% moisture
Eel	Kent	17,460	–	21,011,000
Miscou	Gloucester	4,900	7,967,000	–
Neguac (Tabusintac)	Northumberland	3,870	–	4,685,000
Shippigan Island (Lamek)	Gloucester	3,840	–	4,103,000
Green Point	Gloucester	1,515	–	1,663,000
Escuminac	Kent	2,675	–	3,116,000
Maugerville	Sunbury	285	156,000	–
Pocologan	Charlotte	350	180,000	139,000

Metallic Minerals

ANTIMONY

At Lake George in York county, within 4 miles of the railway, is what is believed to be a large deposit of antimony ore, and it is one of two deposits in the Maritimes from which any antimony has been produced.

The Lake George stibnite occurs disseminated in slates and quartzites, the wall rock containing much arsenical pyrites, and has been worked intermittently since its discovery in 1863. Between 1907 and 1922, 2,200 tons of ore were produced, and at one time a small smelting plant was in operation. A sample of milling ore submitted in 1922 by the then mining company gave on analysis 11·65 per cent antimony and 0·37 per cent arsenic.

Many failures, however, have been associated with the development of this deposit, largely as a result of inadequate methods of concentrating the ore. Gravity concentration

has proved ineffectual on account of the heavy slime losses. To solve the problem the federal Department of Mines conducted research, the results of which were published in 1924.[1] The following flow sheet was recommended as the simplest and most feasible method of concentrating the ore: "Crushing the run of mine ore to 2 inches in a breaker, ball milling in closed circuit with drag classifier to 65 mesh, the classifier overflow to go to the flotation unit of the pneumatic type." In the large-scale pilot test the flotation reagents used were a mixture of coal tar (40 per cent) and coal tar creosote (60 per cent) and sufficient pine oil to maintain a good froth, sulphuric acid being used at the rate of 5 pounds per ton of ore.

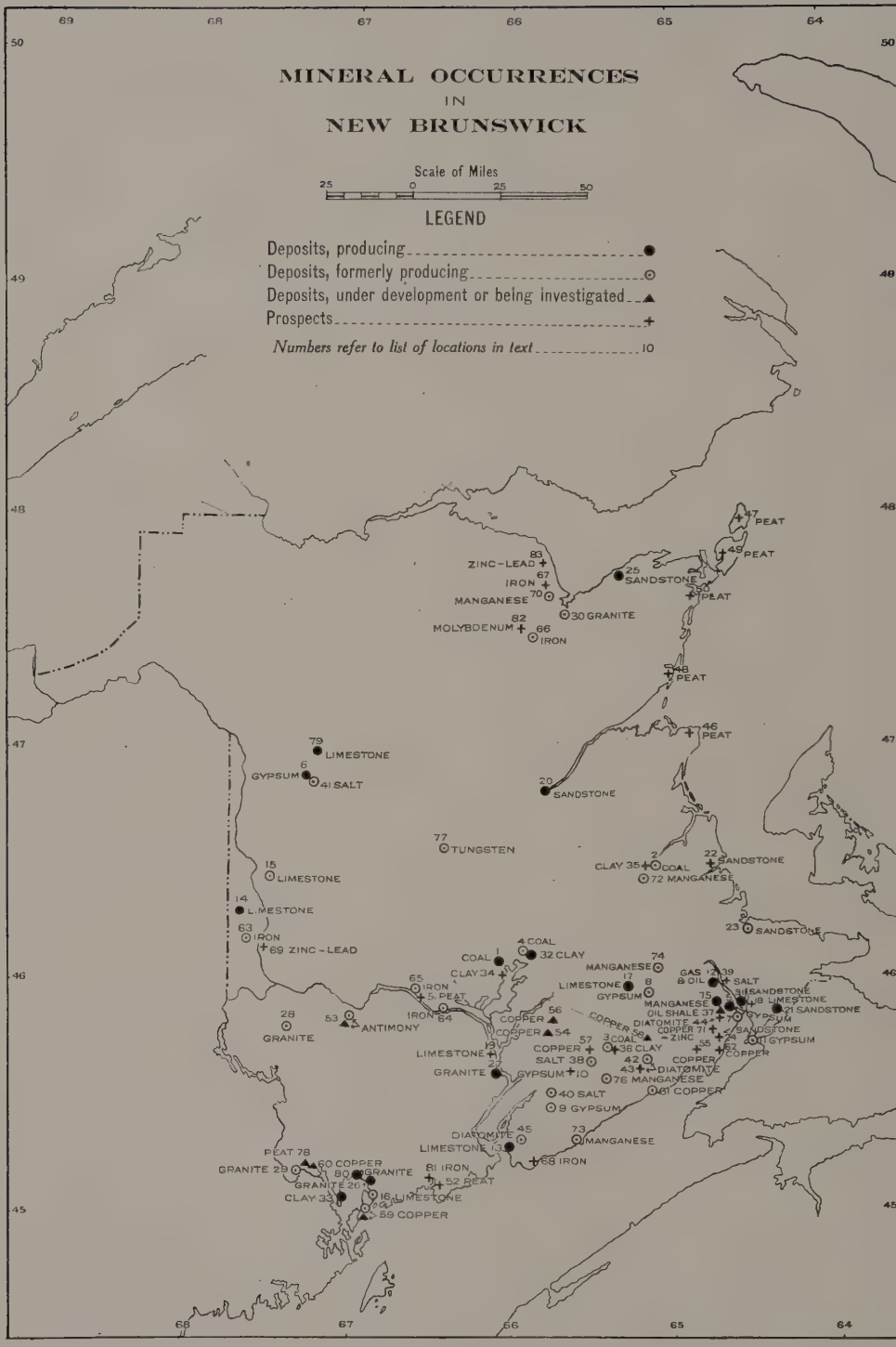
In 1928 new mining interests contemplating an operating procedure different from that followed in the past development of the Lake George stibnite deposits entered the field and in the summer of that year concentrated their activities on exposing the ore bodies on two adjoining properties. More extensive operations are to be undertaken in 1929, and on one of them—where a 210-foot shaft has already been sunk and lateral work done on both the 50- and 200-foot levels—the installation of a 50- to 75-ton mill is planned, which is expected to be operating in the latter part of the year. It was recently (October, 1929) reported that a car of ore was shipped for treatment in the United States.

A small stringer of stibnite was reported as having been discovered in September, 1928, in the Mountaindale district of Queens county. Another investigation of this area is planned in 1929.

COPPER

Despite the many scattered occurrences of copper-bearing minerals, usually in very small veins, none has yet led to a discovery of commercial importance. Three-quarters of a mile east of the railway between Chipman and Norton and one mile from the nearest siding at Scotch Settlement, Kings County, a low-grade chalcopyrite, discovered about 1895, is being carefully investigated. A number of test-pits has already been sunk, a few carloads

[1] Parsons, C. S., "The Lake George Antimony Ores and Their Concentration (1924)"; Mines Branch, Department of Mines, Canada. Memo. Series, No. 17.


MINERAL OCCURRENCES
IN
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Deposits, producing
Deposits, formerly producing
Deposits, under development or being investigated
Prospects
Numbers refer to list of locations in text 10
69 68 67 66 65 64
50 49 48 47 46 45
PEAT
ZINC-LEAD
IRON
MANGANESE
SANDSTONE
GRANITE
MOLYBDENUM
LIMESTONE
GYPSUM
SALT
TUNGSTEN
CLAY
COAL
COPPER
ANTIMONY
GAS & OIL
OIL SHALE
DIATOMITE
ZINC
GRANITE
BOUNDARY
RIVER

LOCATIONS OF NUMBERED DEPOSITS ON MAP

1. Minto, Queens Co.
2. Beersville, Kent Co.
3. Dusinane, Kings Co.
4. Two miles south of Chipman, Queens Co.
5. Hillsborough, Albert Co.
6. Plaster Rock, Victoria Co.
7. Hopewell—Curryville area, Albert Co.
8. Petitcodiac, Westmorland Co.
9. Upham, Kings Co.
10. Apohaqui, Kings Co.
11. Cape Maringouin, Westmorland Co.
12. Stoney Creek, Albert Co.
13. Near Saint John, St. John Co.
14. Brookville, Carleton Co.
15. Ten miles east of Florenceville, Carleton Co.
16. L'Etang peninsula, Charlotte Co.
17. Havelock, Kings Co.
18. Two and one-half miles north of Dorchester, Westmorland Co.
19. Queenstown, Queens Co.
20. Quarryville, Northumberland Co.
21. Sackville, Westmorland Co.
22. Buctouche, Kent Co.
23. Shediac, Westmorland Co.
24. Near Shepody, Albert Co.
25. Stonehaven, Gloucester Co.
26. St. George, Charlotte Co.
27. Spoon island, Queens Co.
28. Between McAdam and Southampton, York Co.
29. Near St. Stephen, Charlotte Co.
30. Near Bathurst, Gloucester Co.
31. Beaumont-Rockland area, Westmorland Co.
32. Near Chipman, Queens Co.
33. St. Andrews, Charlotte Co.
34. Flower Cove, Queens Co.
35. Beersville, Kent Co.
36. Dusinane, Kings Co.
37. Albert Mines—Rosevale area, Albert Co.
38. Sussex, Kings Co.
39. Gautreau, Westmorland Co.
40. Salt Springs, Kings Co.
41. Near Plaster Rock, Victoria Co.
42. Pollet lake, Kings Co.
43. Flood lake, Kings Co.
44. Stannard lake, Albert Co.
45. Fitzgerald lake, St. John Co.
46. Eel and Escuminac bogs, Kent Co.
47. Miscou bog, Gloucester Co.
48. Neguac bog, Northumberland Co.
49. Lamek bog, Gloucester Co.
50. Green Point bog, Gloucester Co.
51. Maugerville bog, Sunbury Co.
52. Pocologan bog, Charlotte Co.
53. Lake George, York Co.
54. Near Scotch Settlement, Kings Co.
55. New Ireland, Albert Co.
56. Near Marrtown, Kings Co.
57. Jordan mountain, Kings Co.
58. Goshen, Albert Co.
59. Adams and Simpson islands, Charlotte Co.
60. Near St. Stephen, Charlotte Co.
61. Goose Creek, St. John Co.
62. New Horton, Albert Co.
63. Near Woodstock, Carleton Co.
64. Maugerville, Sunbury Co.
65. Marysville, York Co.
66. Austin Brook, Gloucester Co.
67. On Millstream river, Gloucester Co.
68. Beveridge Cove, St. John.
69. Near Woodstock, Carleton Co.
70. Near mouth of Elmtree river, Gloucester Co.
71. Ten miles northwest of Albert, Albert Co.
72. Adamsville, Kent Co.
73. Quaco, St. John Co.
74. Near Salisbury, Westmorland Co.
75. Dawson Settlement, Albert Co.
76. Markhamville, Kings Co.
77. Twenty miles above Boiestown, Northumberland Co.
78. Near St. Stephen, Charlotte Co.
79. Oxbow, Victoria.
80. Bocabec, Charlotte Co.
81. Near Lepreau, Charlotte Co.
82. Pabineau lake, Gloucester Co.
83. Tetagouche falls, Gloucester Co.

of ore shipped for trial smelting, and a main shaft now down to more than 100 feet has been placed between two outcroppings of mixed chalcopyrite and pyrite. Between 1902 and 1922 work involving the sinking of a number of short shafts to 48 to 55 feet was intermittently done on this deposit to expose the veins, and two carloads of sorted ore, one of which contained an average of 10·09 per cent copper and 1·19 ounces of silver, and the other 7·99 per cent copper and 1·07 ounces of silver to the ton, were shipped to the United States Metal Refining Company in 1916, the only machinery used for getting out the ore being a gasoline hoisting engine; but in 1922 the active owners died and operations were not resumed until recently when the present holders secured possession.[1]

In 1917 a copper mine near Dorchester upon which much money had been spent in earlier times was reopened and the copper extracted electrolytically, 3,000 pounds of copper being thus obtained, but the plant was closed shortly afterwards, presumably on account of insufficient ore (copper carbonates and sulphides) in place. The old workings are reached from the surface by a shaft and by a tunnel in the side hill. The rock is comparatively soft and consequently easy to work.

Other occurrences are at New Ireland, Albert county, where, however, the percentage of copper and zinc on two properties recently diamond drilled was not high enough to induce the holders of the options to continue operations; near Marrtown in Kings county, where a shaft was sunk in 1928 penetrating a basic rock carrying disseminated native copper; on Jordan mountain, Kings county, on which a low-grade copper carbonate has been uncovered; at Goshen, Albert county, where is now (winter of 1928) being investigated a deposit of malachite and chalcocite of the type commonly found in the Carboniferous and Permian conglomerates and sandstones of New Brunswick and Nova Scotia, and which probably has originated from the solution of disseminated copper-bearing minerals in meteoric waters;[2] on Adams (deposit being examined in winter of 1928) and Simpson islands off Charlotte county, where

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[1] Wilson, M. E., "Mineral Deposits in Nova Scotia and New Brunswick", Geol. Surv., Can., Sum. Rept., Pt. C., 1926.

[2] Idem, p. 96.

attempts to mine malachite were made as long ago as 1863; near St. Stephen, Charlotte county, where a copper-nickel deposit is the subject of present investigation; and at Goose Creek (the old Vernon mine), New Horton, and many other points along the bay of Fundy coast between Milledgeville, St. John county, and Dorchester, Westmorland county.

IRON

Although no iron is now produced, New Brunswick had in early days its small iron industry based on local ores. Between 1848 and 1884 about 70,000 tons of low-grade hematite from shallow deposits about 6 miles northwest of Woodstock were smelted in a small furnace. Limonite from small deposits, 1 to 3 feet deep, at Maugerville and Marysville was also smelted in the same furnace.

The province's most important deposit of iron is that of fine-grained siliceous magnetite, low in grade but mixed with much hematite, which occurs about 21 miles southwest of Bathurst. Mining of this ore commenced in 1907 after a branch line had been constructed to connect the property with the Intercolonial railway (now Canadian National railways) and docks built at Newcastle for ocean vessels of 21 feet draught. In 1911 a concentrating plant was erected to treat the ore before shipment by crushing, screening, and jigging. But as the results were unsatisfactory, the average improvement in iron content being only about 2 per cent, mining operations were discontinued in 1913. In all 180,760 tons were shipped. The reserves of iron ore are estimated at 18,600,000 tons[1] to a depth of 500 feet, but the ore is too low in grade to be marketed in its natural state. It would be necessary either to concentrate it or to follow a method of selective mining, stoping ore of the higher grade only.

The ore occurs in elongated lenses in a schistose quartz-porphyry. The metallic iron content of the various layers ranges from 59 down to 35 per cent, phosphorus averages about 0·8 per cent with manganese 2·7 per cent locally, and sulphur from 0·03 to 0·1 per cent; but locally the percentage of sulphur is much higher, particularly near the

[1] Lindeman, E., "Iron Ore Occurrences in Canada", Mines Branch, Dept Mines, Canada. No. 217 (1917).

contact of the ore with the country rock, where layers of iron pyrites varying in thickness from a fraction of an inch to several feet are frequently found.

Among other occurrences is that on the side of the valley of a small stream entering Millstream river at a point about 8 miles inland and 9 miles north of Bathurst. This deposit of interbanded finely granular magnetite and garnet is 4 to 14 feet wide and has been traced by outcrops for about 900 feet. Pyroxene, epidote, chalcopyrite—in some places rather abundant, and pyrite also occur in the ore. Average samples taken across the deposit showed 45 to 48 per cent iron.

At Beveridge Cove, near Saint John, a sample of hematite from a supposedly large ore-body discovered in 1927 is said to have shown 55·37 per cent iron, 0·03 per cent phosphorus, 0·014 per cent sulphur, 0·06 per cent manganese; 2 miles west of Lepreau a magnetometric examination is said to have indicated the presence of another large body of ore.

LEAD AND ZINC

Occurrences of minerals containing lead and zinc are known at a number of places in New Brunswick, but as in the case of the copper minerals no commercial ore body has yet been uncovered.

In Carleton county, 2 miles below Woodstock on the opposite side of the river, a vein of argentiferous galena, presumably related to the intrusions of Devonian granite in this district, lies along the contact of Palaeozoic shale and quartzite. A shaft was sunk on this property in 1927 to a depth of 56 feet but the sampling tests were not encouraging and the work was abandoned.

Five miles from the mouth of Elmtree river a 6-foot wide vein of zinc blende, galena, chalcopyrite, pyrite, and country rock is exposed in the river-bed, the sulphides occurring in scattered grains and small aggregates. Samples collected years ago assayed, so it was reported, as high as 40 ounces of silver to the ton and in some instances contained traces of gold. Similar sulphide ores are found a few miles south, notably on Rocky brook, 9 miles west of Beresford station on the Canadian National railway,

where a zinc-lead-silver occurrence upon which a little development work had been occasionally done in the past was recently the scene of further investigation; which resulted in the finding of some ore said to be of good quality.

Distant ten miles northwesterly from Albert village by a poor road a small vein containing mainly zinc, with traces of copper, gold and silver was discovered in 1903, and some years ago two shafts were sunk and a tunnel 125 feet long was driven to cut the mineralized zone, which in the tunnel has a width of 25 feet and consists of quartz with pyrite, pyrrhotite, chalcopyrite and galena. In 1928 this property was again examined but not further developed.

MANGANESE

None of the known manganite or pyrolusite in the province can be considered of present commercial importance. Years ago a deposit of pyrolusite embedded in limestone was worked at Markhamville, 8 miles south of Sussex. The amount of ore shipped is said to have been 26,000 tons, having an average of over 40 per cent of the metal. Although this deposit may have been worked out, untouched portions of the ore-bearing formation can be seen in the vicinity.

Known occurrences elsewhere of hard manganese ores are at Jordan mountain, Kings county, at Quaco, St. John county, near Hopewell and Salisbury in Albert county, and near Tetagouche falls in Gloucester county, from each of which places small shipments of ore were made many years ago.

The largest deposit of bog or wad ore is at Dawson Settlement, Albert county, $5\frac{1}{2}$ miles northwest of Hillsborough. Between 1897 and 1900 small amounts of this ore, which is associated with limonite and analyses about 45 per cent of metallic manganese, were briquetted and shipped to iron works at Bridgeville, Nova Scotia, for use in the manufacture of ferro-manganese. The development of this ore for use in colouring bricks is under way, 385 tons having been shipped during 1928 into the province of Quebec for this purpose. Among other occurrences of bog

ore are those at Adamsville, Kent county, from which 50 tons of calcined ore were shipped in 1915 to New York, and along Canaan river in Westmorland county.

TUNGSTEN

On the south of the Main Southwest Miramichi river nearly opposite the mouth of Burnt Hill brook and about 20 miles above Boiestown in York county a tungsten-bearing quartz which probably originated from the intrusion of banded argillites or slates by granite was worked about 13 years ago on a small scale and a few shipments of concentrates made, but owing to the limitations of the plant, the bad road and the rocky swift river—both hampering transportation—the conditions of the market for tungsten, and expensive labour, the mine was closed in 1918. The vein was 1 to 3 feet wide and development was confined almost entirely to a length of 300 feet on the 50-foot level of the 160-foot shaft. The ore treated in the 40-ton per day concentrator contained 1 per cent or less of WO_3. Richer and larger ore bodies may occur to the south-east and northwest along the direction of the ore-bearing zone, but it is doubtful whether any would be found rich enough to be of commercial value.

SYNOPSIS OF MINING ACT

A prospecting licence costing $10 and giving the right to stake as many as ten 40-acre claims can be obtained by any one over 18 years. Each claim must be registered within thirty days of staking with the Mining Recorder at Fredericton, a fee of $1 a claim being charged. To prevent the lapse of mining rights on a claim after December 31 in any year twenty-five days labour must have been performed on it prior thereto.

A mining licence costing $10 a 40-acre claim can be applied for after the full amount of work has been done on the claim or group of claims. This licence will be good for the year in which it is taken out and for the calendar year following, after which it will be renewed at $10 per claim upon proof that twenty-five days work has been performed for each 40 acres during the preceding year. A survey must

be made by a deputy land surveyor at the cost of the applicant and plans thereof filed before the mining licence will be issued.

A mining lease for a mineral or minerals specified, good for twenty years and renewable up to eighty years, will be granted a mining licence holder who has complied with the requirements of his licence and who under it has opened up and for at least six months worked a mine. The rental is $10 a year for each 40 acres.

Further information can be obtained on application to the Department of Lands and Mines at Fredericton.

96710—8½

FISHERIES[1]

OFF the shores of New Brunswick and of the neighbouring provinces, Nova Scotia and Prince Edward Island, lies a fishing ground 200,000 square miles in extent and one of the greatest in the world. And by virtue of this the fisheries of New Brunswick have provided an important source of wealth ever since the first settlers arrived, contributing, even as far back as 1870, $1,131,433, or 17 per cent, to the $6,577,391 derived from Canadian fisheries in that year. In 1928 the contribution was $5,001,671, a figure somewhat greater than the annual average of $4,858,124 in the period 1922-27 and representing 9·1 per cent of the 1928 output-value of $54,971,319 for all Canada. This decrease in percentage first occurred a number of years ago mainly as a result of the extensive development of the Pacific coast fisheries of British Columbia and, to a less degree, of the expansion of the Atlantic fisheries of Nova Scotia, these two provinces having now ranked for some time first and second respectively in the yearly output-value of fish, while New Brunswick has occupied the third position among Canada's provinces.

STATISTICS OF CATCH

The following tables give (1) the quantities and values to the fishermen at the point of landing of the chief kinds of fish caught in 1928, including those taken in inland waters, (2) a comparison between the 1928 catch and the average annual catch in the ten-year period 1918-1927 of some of the more important varieties:—

[1] This section has been prepared with the assistance of the Department of Marine and Fisheries, Ottawa.

TABLE I

Kind of fish		Quantity	Value	Kind of fish		Quantity	Value
			$				$
Lobster	cwt.	57,970	632,556	Tom-cod	cwt.	17,266	26,044
Smelts	"	59,866	576,629	Alewives	"	24,158	21,474
Salmon	"	12,557	195,587	Hake and cusk	"	78,726	50,534
Herring	"	335,833	181,801	Shad	"	8,126	40,165
Cod	"	172,874	269,075	Mackerel	"	18,611	34,779
Sardines	brls.	279,349	349,555	Flounders	"	986	2,122
Oysters	"	12,383	81,822	Halibut	"	66	995
Haddock	cwt.	28,878	54,430	Winkles	"	368	891
Clams and Quahaugs	brls.	30,058	45,643	Skate	"	142	190

TABLE II

Kind of fish		Catch in 1928	Average annual catch 1918-1927
Lobster	cwt.	57,970	61,900
Smelts	"	59,866	54,912
Salmon	"	12,557	20,775
Herring	"	335,833	338,080
Cod	"	172,874	193,285
Sardines	brls.	279,349	201,235
Oysters	"	12,383	11,431
Haddock	cwt.	28,878	14,816
Clams and Quahaugs	brls.	30,058	22,231
Alewives	"	24,158	42,467
Mackerel	cwt.	18,611	17,015

In 1928 the total capital invested in both primary and secondary operations was $5,654,401, which compares with $3,765,020 in 1914, and the number of employees was 13,309, of whom 2,006 were engaged in canning and curing establishments.

LOBSTER

Although the Atlantic coast is the premier lobster-producing region in the world, the varied conditions found from the bay of Fundy to the strait of Belle Isle are not all equally favourable. In so far as the coast of New Brunswick is concerned the lobster is comparatively rare in the bay of Fundy and of large average size because of the lack

of suitable water for breeding; in Northumberland strait, however, the waters are generally shallow and warm in summer, thereby assuring excellent breeding conditions and a productive fishery, although not the best on the Atlantic coast.

Of the 1928 catch in New Brunswick, namely 5,797,000 pounds, approximately 2,438,400 pounds were shipped in the shell and the remainder canned. The total market value of these products was $1,037,195.

The prosperity of most lobster fishermen is determined by the markets for both fresh and canned lobsters. For although the fisherman realizes greater profit from shipments-in-shell than when he sells to the canner, the fresh lobster business alone, except perhaps in some areas particularly favoured for the export trade, does not assure a sufficient remuneration to compensate him for the loss he would entail if he were not able to market that portion of his catch not so saleable; in fact, in some parts of the province the canning factory is his only market. There were 101 licensed lobster canneries in operation in 1928 compared with 212 ten years ago when almost two-and-a-half times as many lobsters were canned. This changed condition is attributable in part to the diminished catch in recent years—the natural result of illegal fishing and the taking of both small lobsters and spawn-carrying lobsters—and in part to the expanding market for fresh lobsters. There is no duty on live lobsters entering the United States, and almost all New Brunswick's shipments of lobster in this form go to that country. The markets for fresh lobster are expected to be further extended whenever the modern methods of freezing fish are successfully adapted to lobsters-in-shell. Much success has already been achieved in freezing boiled lobster meat. The picked meat is wrapped in cellophane, packed in 4-ounce cartons and subjected to the brine-freezing solution; when the meat is thawed its taste is not inferior to that of the fresh-caught and boiled lobster.

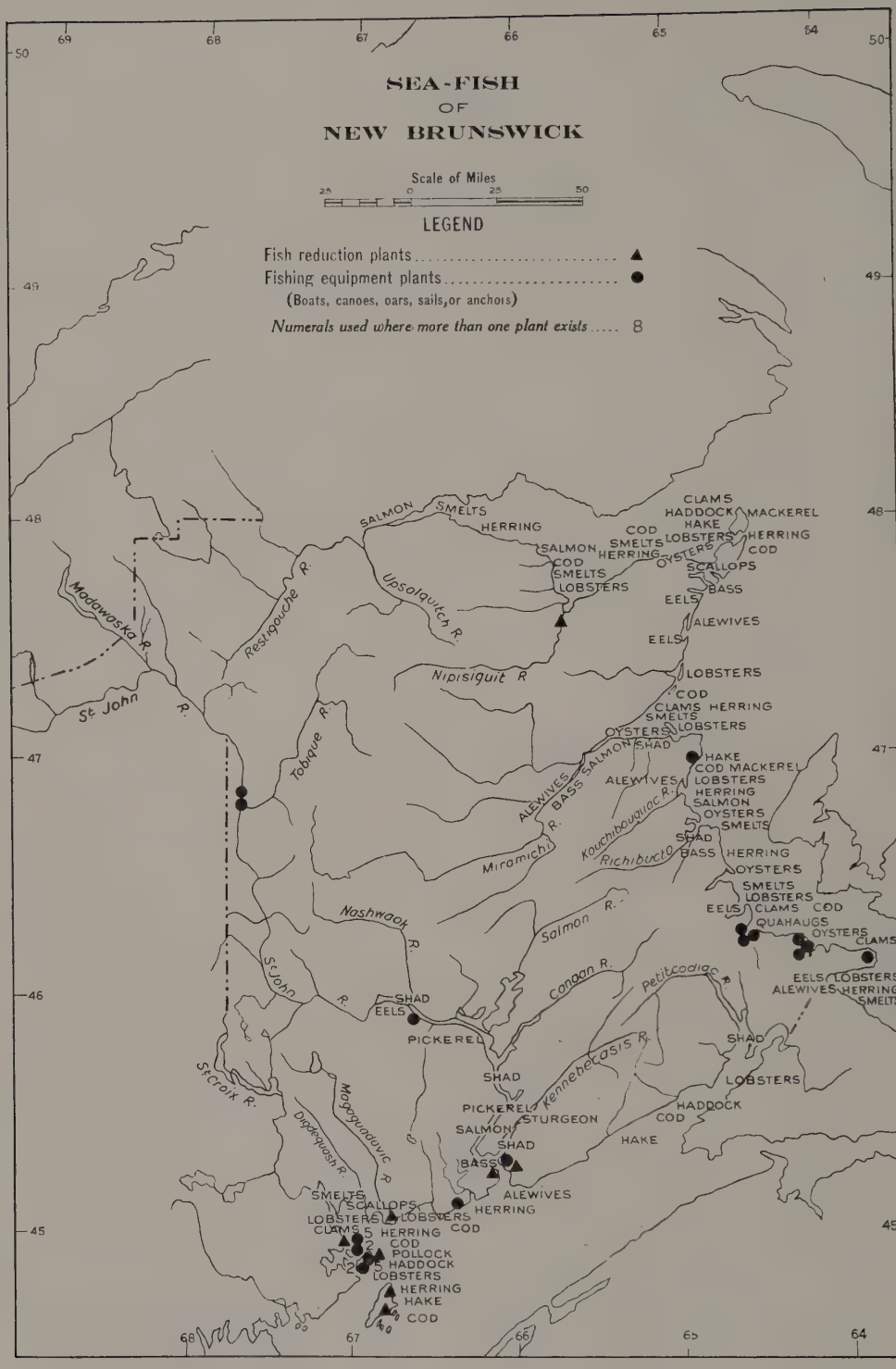
The number of lobster canneries is still perhaps in excess of the requirements of the industry, and the amalgamation of some of the smaller plants (only 3 out of the 101 had an output value of more than $50,000 in 1928) would be beneficial and should facilitate the standardization

of factories and crates, and the marketing of a good product only. Complaints have at times been made by foreign buyers because of discoloured meat and careless packing. Many of the canneries are adequate, however, in every way, great attention being paid to cleanliness, and although there are some that cannot yet be placed in this category steps are being taken, so it is understood, to bring all canneries up to the necessary standard. In view of the intense competition of foreign fish products, particularly Japanese crab meat and South African crayfish, with canned lobster, it is essential that New Brunswick's canneries adopt the best scientific practice so as to produce a standardized product which meets modern demand.

The principal foreign market for canned lobsters is the United Kingdom, which lately has been importing all its requirements from Canada, as the Newfoundland lobster fisheries were closed for four years and not reopened until January, 1928. Unfortunately, the European consumption has been declining, partly as a result of the competitive Japanese crab meat; but despite this falling off of foreign demand there appears to be no reason why the Canadian market should not be more thoroughly explored. For this purpose and for the promotion of the lobster industry generally, co-operation among canners and dealers is perhaps the first desideratum.

SMELTS

On the Atlantic coast of North America the smelt is found from New Jersey to the strait of Belle Isle. With the exception of the north shore of the gulf of St. Lawrence, it is fished to a greater or less extent everywhere along the Canadian portion of this stretch of coast, but today nearly one-third of the total Canadian catch comes from a coastal strip of about 25 miles in Northumberland county, the waters of which, particularly those at the mouth of the Miramichi river, provide the foremost smelt fishery of the world. This river is ideal for the smelt; it is tidal for a distance of over 30 miles from the sea, has a narrow range of tide, 3 to 4 feet, and is only about 3 fathoms deep. Near its mouth it broadens rapidly into a shallow inner bay about 75 square miles in extent and sheltered from the


SEA-FISH
OF
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Fish reduction plants ▲
Fishing equipment plants ●
(Boats, canoes, oars, sails, or anchors)
Numerals used where more than one plant exists 8
69 68 67 66 65 64
50 49 48 47 46 45
Madawaska R.
St John R.
Restigouche R.
Upsalquitch R.
Tobique R.
Nipisiquit R.
Miramichi R.
Nashwaak R.
St John R.
St Croix R.
Magaguadavic R.
Digdeguash R.
Salmon R.
Canaan R.
Petitcodiac R.
Kennebecasis R.
Kouchibouguac R.
Richibucto R.
SALMON SMELTS HERRING
SALMON SMELTS COD HERRING
COD SMELTS LOBSTERS
CLAMS HADDOCK MACKEREL HAKE
COD SMELTS LOBSTERS HERRING
OYSTERS COD SCALLOPS
EELS BASS
ALEWIVES
EELS
LOBSTERS
COD
CLAMS HERRING SMELTS
OYSTERS LOBSTERS
SHAD
HAKE COD MACKEREL
ALEWIVES LOBSTERS
HERRING SALMON
OYSTERS SMELTS
SHAD BASS HERRING
OYSTERS SMELTS LOBSTERS
EELS CLAMS COD
QUAHAUGS OYSTERS CLAMS
EELS LOBSTERS
ALEWIVES HERRING SMELTS
SHAD
LOBSTERS
HADDOCK COD
HAKE
SHAD EELS
PICKEREL
SHAD
PICKEREL STURGEON
SALMON SHAD
BASS
ALEWIVES HERRING
SMELTS SCALLOPS
LOBSTERS LOBSTERS COD
CLAMS 5 HERRING
2 COD
2 POLLOCK
5 HADDOCK
LOBSTERS
HERRING
HAKE
COD

open waters by a series of sandy islands and shoals, extending beyond which is the outer bay, which continues to broaden and to deepen only very gradually towards the sea.

The bulk of the smelts is sold frozen to dealers in the United States, where, pending demand, they are placed in cold storage. The prices paid for smelts on the ice in the Miramichi river vary from 6 to 14 cents a pound, and at Richibucto from 7 to 12 cents. The fish are sold on a commission of from 7 to $12\frac{1}{2}$ per cent to the commission merchant in the United States. This method of marketing could no doubt be much improved, for with co-operation among producers and dealers unnecessary costs, especially in the number and amount of commissions paid, could be eliminated, and a higher and more stable level of prices assured to the fishermen as well as a safer margin of profit to the dealers.

To the Canadian catch of 91,877 cwt. in 1928, of which 81,141 cwt. were sold to the United States, New Brunswick contributed 59,866 cwt.

SALMON

Salmon fishing is carried on by means of stake-nets in river estuaries, the more important of which are those of the St. John, Miramichi and Restigouche. In bays and along the sea-coast anchored nets are generally employed, although in recent years the use of the drift-net has been extensive in Miramichi bay. By this latter method a boat having a long net or several nets joined together, extended like a vast curtain, drifts with the tide, the length of the nets being on the average 750 fathoms. In 1927 there were 61 boats so engaged.

The salmon fisheries of the famed Restigouche river and Chaleur bay are being well maintained. The headwaters of the Restigouche are held by riparian owners and the fishing rights are leased from the provincial Government, which last year derived $75,500 therefrom in place of the $16,000 formerly paid in each of the 10 years previous to 1927.

HERRING AND SARDINES

Although the herring is found along the entire 2,000 miles of the Atlantic coast of Canada, thirty to over forty per cent of the total annual catch of between one hundred and two hundred million pounds is actually now taken from a coastal strip only 35 miles long, being the frontage of Charlotte county on the bay of Fundy. At the mouth of this bay conditions are excellent for the herring, which may be found there throughout the year, whilst in more northerly waters it appears to be a seasonal fish occurring near the

Fish Cannery at Black Harbour, the Largest of its Kind in the World

coast only during the summer. A few adult herring are taken in this area and marketed fresh, boneless, canned, smoked, or pickled, but the fishery as at present developed is almost wholly for the young herring, the so-called sardine, which has been taken in enormous quantities without interruption for many years and without any apparent diminution of the supply. There is no comparable herring fishery elsewhere in the world. Most of the sardines are canned and shipped all over the world, particularly to Mexico, the West Indies, Australia, British Guiana and

British South Africa. In 1928 there were marketed 257,881 twenty-five pound cases of canned sardines valued at $1,032,874, in addition to 214,675 barrels of fresh and salted sardines valued at $251,897.

POSSIBILITIES FOR THE EXTENSION OF THE HERRING INDUSTRY

As already stated very little use is being made of the enormous quantities of adult herring found in the area where the sardines are taken. Much consideration, however, has lately been given to the question of establishing a large plant for making canned herring, or the higher priced type of canned sardine, similar to the product now imported to the value of $600,000 a year from Norway. The canning of herring in Canada is in its infancy at present, and if further developed would no doubt greatly extend the market for the larger herring, the output of which has been declining in recent years as a result of the diminishing consumption of both smoked and salted herring. Furthermore, the markets for boneless canned herring and brine-frozen fresh herring could possibly be extended, but careful studies would have to be made to ascertain the domestic and foreign market requirements for these various products.

Along those portions of New Brunswick's littoral where the sardine is only occasionally found the mature spawning herring are readily taken when they congregate near the shore in certain areas to deposit their eggs. This herring, however, is inferior to the fat type found in deep water, and if the fishery could be prosecuted in such water with proper appliances to locate the schools of fat herring the fishing season could be greatly extended. But to do this would necessitate much expenditure in equipment and would take time to develop; nevertheless the possibilities along these lines should not be overlooked whenever it has been established that the better quality product will ensure broader markets and, concomitantly, higher prices.

In regard to pickled herring the kind produced in New Brunswick, and the Maritime Provinces generally, is not usually of a high standard. This probably accounts for declining exports in recent years. Although the quality has shown some improvement in certain districts since the Fish Inspection Act of 1914, there is ample room for progress everywhere.

Again, a broader market for smoked herring could no doubt be developed if a higher quality article were produced and greater attention given to grading and packing. The province's output of smoked herring fell from 101,112 cwt. in 1926 to 17,613 cwt. in 1927, but increased to 40,368 cwt. in 1928.

FRESH FISH

By this term is to be understood frozen and unfrozen fish, and fish that have been lightly smoked, such as smoked fillets and kippered herring.

It was not until 1908, when the Department of Marine and Fisheries undertook to pay one-third of the express charges on less than carload lots of fish from Atlantic ports to points west of New Brunswick, that fish from the Maritime Provinces effected an entry into the markets of Ontario and Quebec, and today these markets provide the best domestic outlet for the fresh fish of New Brunswick.

It has been estimated by the Royal Commission on Fisheries that the markets of Quebec and Ontario at present purchase annually from the Atlantic sea-coast of Canada and of the New England States the product of approximately 31,500,000 pounds of ground fish (*i.e.*, cod, haddock, and flounder) in the round (*i.e.*, cleaned and dressed but with the head on), and herring, mackerel, salmon and smelts; the Maritime Provinces of Canada themselves consume about 13,500,000 pounds annually; and the markets of Western Canada, the United States, and elsewhere 45,000,000 pounds annually. Estimates of the ground fish sold in Ontario and Quebec are given in the following table in which the weight of the fish, whether as fresh fillets, smoked fillets, finnan haddie, or headless, is given in pounds of fish in the round.

Form in which marketed	Quebec, weight in pounds	Ontario, weight in pounds
Round and headless	8,500,000	1,800,000
Fresh fillets	3,750,000	3,500,000
Smoked fillets	2,850,000	4,700,000
Finnan haddie	550,000	1,500,000
Total	15,650,000	11,500,000

The methods of marketing fish may soon undergo a rapid change in view of the experiments conducted at the Halifax Experimental Station of the Department of Marine and Fisheries where it has been demonstrated that rapid freezing is commercially feasible and that the particular process devised is more economical than those used elsewhere. As yet, however, only a few of such freezing systems are operating in the Maritimes and no large quantity of fresh fish is being frozen by this method. But there is no doubt that when the public is convinced of the improved quality of rapidly frozen over air-frozen fish the markets for fresh fish whether in the round or in fillets—which latter are gaining in favour—will materially expand at home and abroad.

DRIED FISH

The dried salt fish industry, which embraces codfish, haddock, hake, pollock, and cusk, has long been conducted, but is not as great as formerly. In 1928, however, the output showed a decided improvement over that in 1927. The cod taken in the former year amounted to 172,874 cwt. compared with 136,773 cwt. in 1927, and the value of dried cod marketed was $321,333 against $169,548. The catch of pollock increased from 7,693 cwt. to 34,118 cwt. and there were notable increases in the outputs of hake and cusk, but that of haddock fell from 33,834 cwt. in 1927 to 28,878 cwt. in 1928.

About 70 per cent of all the fish used in New Brunswick's dried salt fish industry is taken on the south side of Chaleur bay, where it is usually found to be of high quality.

During the past few years the market prices for dried fish have been low because of the increased output in Europe, notably in Iceland and the United Kingdom, and this has occurred at a time when the cost of constructing and equipping fishing vessels is almost twice what it was prior to the war. The burden of capital investment can be offset to some extent by the longer employment of vessels in the fisheries each year, especially if motor power is more generally adopted so as to make possible more frequent returns to port.

Among the producers of dried cod there is keen competition in the world's markets, and exporting countries like Norway and Iceland hold a strong position largely

because of the quality of their well-advertised products. Nevertheless there is no apparent reason why New Brunswick should not eventually obtain an appreciable share in the shipment of dried fish to the British West Indies, British West Africa, the United States, Cuba, Porto Rico, Brazil, Italy, and Portugal, and capture a part at least of some of the foreign markets now held by other countries, such as Norway, Iceland and Newfoundland, producing the same kind of fish. The market that formerly existed in Great Britain for salted cod from overseas has gradually declined in face of the growing preference for fresh fish.

OYSTERS

The 1928 output of oysters, namely 12,383 barrels, is small compared with the 28,083 barrels taken in 1886. The decline has resulted from a combination of causes. Except in a few places there has never been intelligent cultivation of oyster areas, artificial cultivation having been seldom attempted. The area of $12\frac{3}{4}$ acres leased by Mr. Barnes at Buctouche is an excellent illustration of the success that can be attained by proper cultivation, by the application of scientific methods in protecting the spawn, and by the general care of the beds. The production in 1927 from this small area was 564 barrels, the oysters of excellent quality and much in demand not only in Canada and the United States, but also in England and France.

As a result of scientific studies much information is now readily available regarding the propagation of the oyster, how to increase the crop of seed oysters, how they feed and grow, and how they may be protected from enemies. Extensive surveys of oyster bottoms have yielded practical recommendations for the improvement of the industry. Experiments, for instance, carried out by officers of the British Ministry of Agriculture and Fisheries have demonstrated that tank cultivation carried out with due observance of certain simple precautions probably offers an even chance of a good "spat", whilst in natural spawning the chances are from 5 to 10 to 1 against.

SCALLOPS

Although the average annual output of scallops during the last five years has been small, about 1,350 barrels—almost all from the counties of Charlotte and Gloucester—,

and only amounted to 50 barrels in 1928, evidence exists that scallops are to be found in substantial quantities in places outside the recognized beds, notably along the northern shores of New Brunswick.

Under proper selling organization the Canadian market for fresh scallops is probably capable of great expansion, and any danger that might arise from an over-production in some years could be minimized by canning some of the output in a form attractive to the consumer.

MACKEREL

In New Brunswick this fish is largely restricted to the warmer waters in the southern part of the gulf of St. Lawrence, and the catch in any locality is subject to wide variation.

The export demand for both fresh and pickled mackerel has declined in the last two years, largely as a result of the unusual increase in the catch of mackerel in the United States—which country normally imported most of the available supplies from New Brunswick and Nova Scotia —and of greater competition from Norwegian exports.

If the quality of the pickled mackerel is improved, and if the canning of mackerel is conducted on an appreciable scale accompanied by sufficient advertising, better prices could be secured for this fish and the market expanded, for there is no doubt large quantities could be taken along the east coast. The use of rapid freezing will no doubt extend the sale of fresh mackerel and will help to provide stock for canning, thereby overcoming difficulties which might arise in the operation of a factory as a result of fluctuations in the catch.

MARKETS IN UNITED STATES AND GREAT BRITAIN

Despite its proximity to the United States, New Brunswick's trade with that country in certain kinds of fish is handicapped by the United States Tariff Act of 1922 under which the following duties prevail:—

Salmon, halibut, mackerel, fresh, frozen, or packed in ice	2 cents per lb.
Other fish, fresh, frozen or packed in ice, and not specially provided for	1 cent per lb.

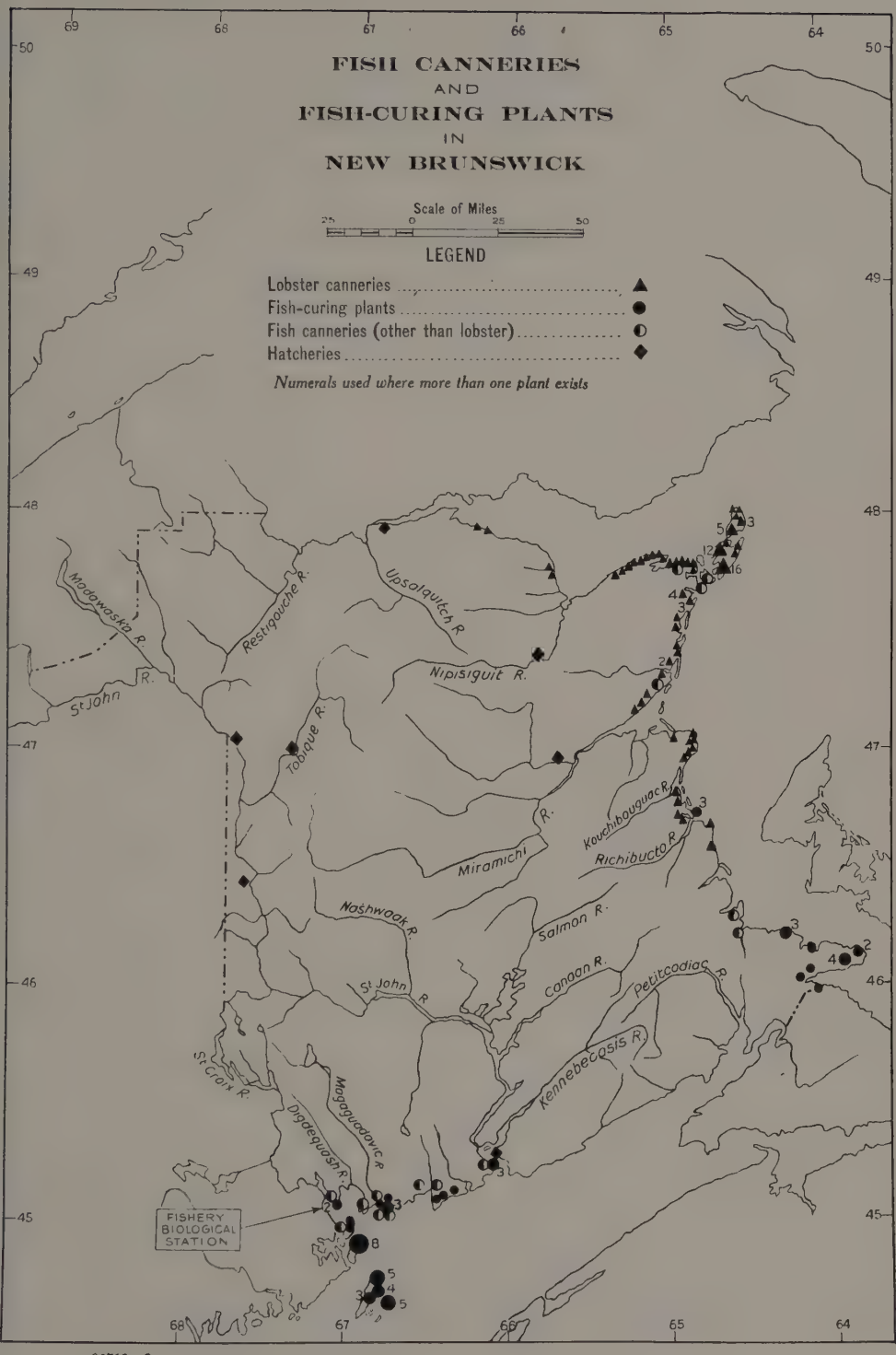
Salmon, pickled, salted or otherwise preserved	25 per cent ad valorem.
Finnan haddie	25 per cent ad valorem.
Dried fish, salted or unsalted	1¼ cents per lb.
Smoked herring, skinned or boned	2½ cents per lb.
All other fish, skinned or boned, in bulk, or in immediate containers weighing with their contents more than 15 lbs. each	2½ cents per lb. net weight.
Herring and mackerel, pickled or salted, whether or not boned, when in bulk, or in immediate containers weighing with their contents more than 15 lbs. each	1 cent per lb. net weight.
Fish (except shellfish) by whatever name known, packed in oil or in oil and other substances	30 per cent ad valorem.
All fish (except shellfish), pickled, salted, smoked, kippered or otherwise prepared or preserved (except in oil or in oil and other substances), in immediate containers weighing with their contents *(a)* not more than 15 lbs. each, *(b)* more than 15 lbs. each, or in bulk	*(a)* 25 per cent ad valorem. *(b)* 1¼ cents per lb. net weight.

The existence of these duties has no doubt resulted in the practical closing of the United States market to certain kinds of New Brunswick fish, and the effect has been to induce a number of fishermen from the Maritime Provinces to emigrate to the American fishing fleets.

Fresh sea herring and smelts and tuna fish, fresh, frozen, or packed in ice are exempt from duty, as are also shrimps, lobsters, and other shellfish, fresh, frozen, packed in ice, or prepared or preserved in any manner.

In so far as Great Britain is concerned, that country constitutes at present a Canadian market mainly for various forms of canned or processed fish, of which the most important single item is canned salmon from British Columbia. Great Britain's dependence during the last four years on the Maritime Provinces of Canada for canned lobsters has already been mentioned (p. 119).

Very little fresh fish, however, reaches the United Kingdom from Canada. This is largely accounted for by the fact that owing to the irregular prices prevailing for fish in


FISH CANNERIES
AND
FISH-CURING PLANTS
IN
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Lobster canneries
Fish-curing plants
Fish canneries (other than lobster)
Hatcheries
Numerals used where more than one plant exists
69
68
67
66
65
64
50
49
48
47
46
45
Madawaska R.
St John R.
Restigouche R.
Upsalquitch R.
Nipisiguit R.
Tabique R.
Miramichi R.
Kouchibouguac R.
Richibucto R.
Nashwaak R.
St John R.
Salmon R.
Canaan R.
Petitcodiac R.
Kennebecasis R.
St Croix R.
Magaguadavic R.
Digdeguash R.
FISHERY BIOLOGICAL STATION

96710—9

that market because of the daily fluctuations of the catch from Britain's own fisheries, a Canadian shipper of fresh fish cannot possibly forecast what price he would realize, and it is useless for him to send spasmodically large supplies of particular kinds and to market them quickly in the manner customary in the British industry.

Success will only be achieved when fish of the best quality can be sent under such conditions of preservation that it can be marketed gradually. For it is only by this means that the wholesale prices of fresh fish marketed both in Canada and Great Britain can be stabilized, and when that time arrives the way is paved for a reduction in retail prices and ultimately increased fish consumption. The attainment of success along these lines has been brought much nearer as a result of the development of the rapid freezing process (p. 125). In the summer of 1929 consignments of salmon were brought in passenger steamers from the Atlantic coast of North America and delivered in England in a condition equal to that of the best Scottish salmon. There is a demand for considerable supplies of fresh fish in Great Britain during the fall and winter months, and according to the report of the Imperial Economic Committee it would require only a relatively small expansion in the demand for white fish in Great Britain to absorb both greater supplies from the British fisheries and larger imports from Canada. The Canadian exports to the United Kingdom of fresh and frozen salmon amounted to 15,126 cwt. in the year ending March 31, 1929, compared with 11,110 cwt. in 1928, but exports of fresh haddock and cod were nil, and those of halibut only 499 cwt.

CANNERIES

Exclusive of the 101 lobster canneries and the two sardine factories operating in 1928, there were only nine other licensed canneries, seven of which treated mainly clams, one quahaugs, and the other kippered herring. Scallops and oysters are being canned in but trifling quantity because of the present small output of these fish.

Of the 30,058 barrels of clams and quahaugs taken in 1928, all but 6,941 barrels were canned, the demand for which in Canada and the United States is said to exceed the supply. Consideration might therefore be given to the extension of this fishery industry.

Worthy of consideration also is the canning of crab meat, which is being successfully done in a factory in Prince Edward Island, and of other fish not now being processed.

FISH BY-PRODUCTS

From fish waste can be derived a product known as fish meal, for which a large foreign market has existed since the war, and for which an appreciable domestic market is foreshadowed, if enquiries such as those the Maritime Trade Commissioner at Toronto has received from Ontario are any criterion. White fish meal made from cod, haddock, and other ground fish has proved to be an excellent protein food for cattle and poultry, and is extensively used for this purpose in Europe, particularly in Germany. It is a highly concentrated food and should always be given in limited quantities and in conjunction with other foods. The feeding of fish meal to hogs will not give a taint to the flesh if ground white fish meal is used in the amounts customarily recommended.

White fish meal of the type in demand in Europe contains from 55 to 60 per cent of protein and about 15 to 20 per cent of phosphate of lime, and is at present expensive compared with cotton seed, linseed and groundnut cakes which are used for similar purposes. Nevertheless Germany has always been a ready purchaser of fish meal.

Herring meal, on the other hand, usually contains certain strongly smelling substances which impair its value as a food; it has an outlet, however, almost as valuable, as a fertilizer.

Concurrently with the manufacture of fish meal can be obtained fish oil, which finds important use in the soap, leather, rubber, waterproof material, and cordage industries, and as a drying oil in the manufacture of paints and varnishes. There are 7 licensed concerns in the province utilizing fish waste for the manufacture of one or more of the products, meal, oil, fertilizer, and glue.

Fish-filleting factories have much waste material, and should they greatly increase, as is not at all unlikely in view of the consumer's growing preference for fillets, fish waste

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in sufficient quantity could probably be obtained, if not from a single large-scale factory, at any rate from a number of near-by small factories, to make profitable the production of fish meal and other by-products.

In filleting 100 pounds of fish there is a waste of about 67 pounds; this would yield 12 pounds of fish meal which probably could be sold at about 4 cents a pound, f.o.b., Saint John. Bristol, Liverpool, Hull and Glasgow in the United Kingdom, Hamburg in Germany, and Rotterdam in Holland are important foreign centres for the fish meal and fish oil trade. Bristol is also a market for poultry grit derived from lobster, clam, and other shell fish. In this latter connection New Brunswick shell-fish canners should not overlook the market for crushed shells which is offered by the growing poultry industry of their own province and of Canada generally, and although some are utilizing their waste product in this way, effective co-operation among, say, the lobster packers, might lead to the profitable disposal of substantial quantities of shells now wasted.

EDIBLE GELATINE

In connection with a filleting industry of appreciable size consideration might also be given to the use of selected fish skins, such as those of cod and haddock, in the preparation of an edible gelatine. In the second report of the Adhesives Research Committee of the British Department of Scientific Research it is stated that a process has been developed whereby a colourless, odourless, and tasteless cake-gelatine can be prepared without great difficulty. All rights in the process have been acquired by the Lynn Manufacturing Company, 28 Basinghall St., London, E.C. 2.

For extending the supply of material suitable for the manufacture of gelatine use could be made of certain species of fish that are now thrown away by Canadian fishermen because they are considered unfit for human consumption. Those portions of the fish not used for gelatine and glue manufacture would have to be converted into fish meal for the economical operation of such an industry.

COD OIL

There are some localities in New Brunswick, notably in the neighbourhood of Shippigan island and Caraquet bay, where fishermen collect fish livers, principally those of the cod. The crude liver oil so obtained is refined either in some other Canadian province or, which is more usual, in the United States. In 1928 New Brunswick produced 46,848 gallons of cod oil, of which 23,696 gallons were of medicinal grade.

FISH SOUNDS

Another possible by-product of New Brunswick's fishing industry is isinglass. This product, which is at present used chiefly in pharmacy, in the textile industry, and in the making of certain high-grade adhesives, can be derived from the sounds or swimming-bladders not only of the sturgeon, which is the main present source of world supplies, but also of the hake, cod, ling, and the haddock, as has been demonstrated by the Adhesives Research Committee of the British Department of Scientific and Industrial Research. This committee evolved a method whereby the disagreeable odour usually associated with isinglass derived from sounds other than those of the sturgeon has been eliminated, and has obtained a product equal in practical value to that from sturgeon.

The chief fish from which sounds are now sometimes saved in Canada for use in the production of isinglass is the hake. The few hundredweight of dried hake sounds, which are occasionally produced in New Brunswick, are all exported to the United States as there is no isinglass factory in Canada.

Again, it has been known that in France skate skins, which have been treated in some special way, have been successfully used in the clarification of wines. Dr. Kernot of the Adhesives Research Committee conducted research to find out this special process and what chemical treatment must be applied to the skins of cod, haddock, and ling to make them serve the same purpose, and it was stated in 1927 that he had been successful.

Sounds might be collected fresh on the boats or from filleting factories, which would serve as a source of both sounds and skins.

PEARL ESSENCE

Except for 1926 there has been in operation since 1921 in Grand Manan a by-product industry which has proved of much value to the fisherman. In this industry a use is made of fish scales, largely from the herring. These are removed before the fish are salted for the smoke-house, and shipped to the United States where the crystals of guanin are separated and converted into pearl essence for use in the manufacture of artificial pearls and other products.

WATER-POWERS[1]

EVER since the days of the early settlers water-power has been a dominant factor in the industrial life of New Brunswick. Formerly, nearly every river and stream had its saw-mill or grist mill serving local needs, while larger mills at favourable points on the principal rivers supplied the sawn lumber for export trade. And although many of these early structures have been abandoned and some of them have entirely disappeared, modern generating stations have been constructed to supply large pulp and paper mills and, through the transmission systems of central electric station organizations, a multitude of other users. At the present time there is considerable activity in the pulp and paper industry based upon important power sites on the St. John and Nipisiguit rivers.

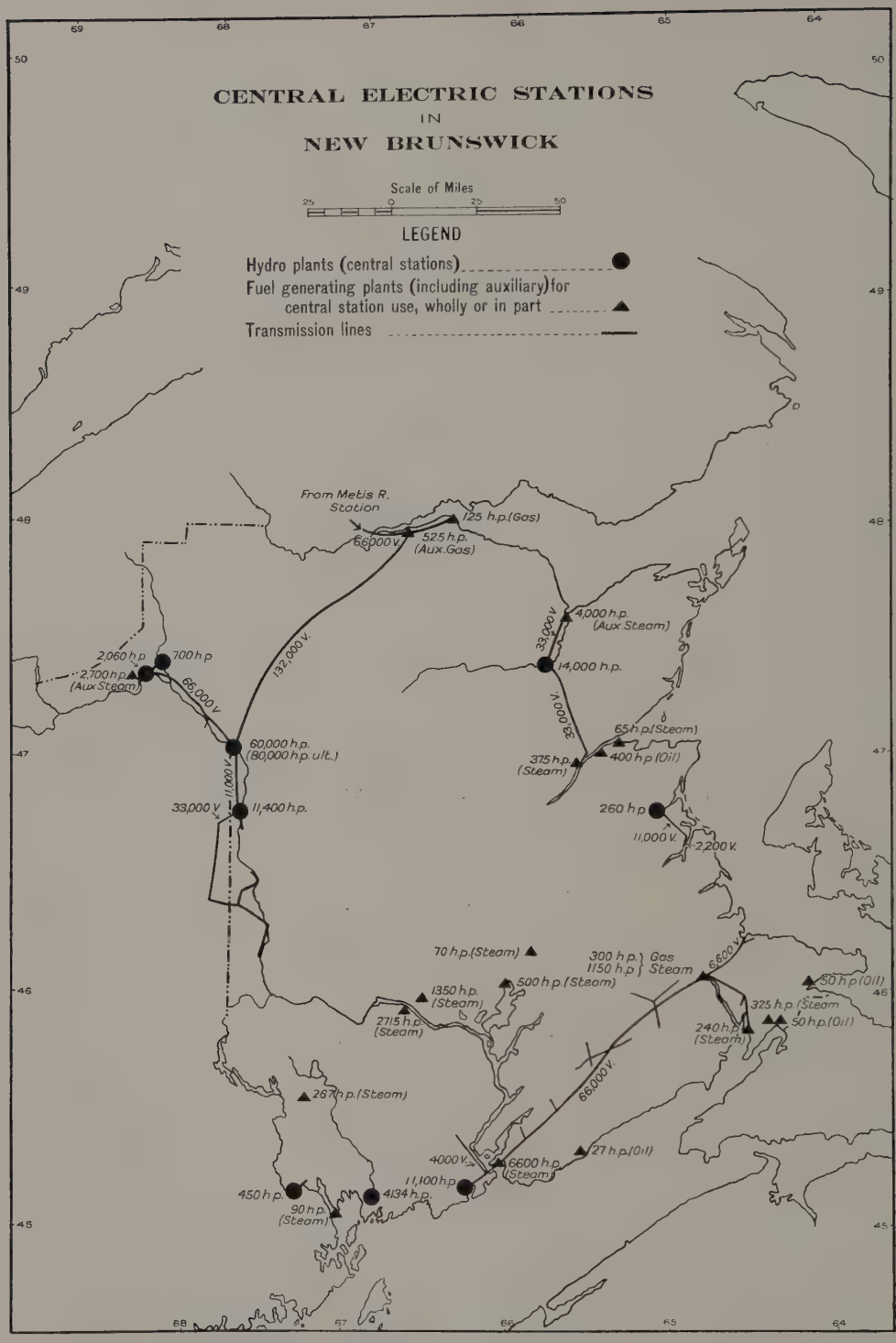
The Dominion Water Power and Reclamation Service of the Department of the Interior has been carrying on investigations of the water-power resources since 1918 under an agreement between the provincial Government and the Department of the Interior. This work, involving stream measurement, basic power surveys, and storage investigations, has greatly extended the information available, which previously had been confined to a limited number of outstanding sites and to the St. Croix and St. John rivers on which some work had been done by United States authorities and the International Joint Commission.

The most important and most exacting part of water-power investigatory work is the determination of run-off characteristics, and accordingly stream measurement work has received the special attention of the department to the end that actual stream flow data might be available on all the more important rivers of the province.

TOTAL AVAILABLE POWER RESOURCES

Concurrently with the stream flow and power investigatory work of the Dominion Water Power and Reclamation Service, the New Brunswick Electric Power Com-

[1] Prepared by the Dominion Water Power and Reclamation Service, Department of the Interior.



In December, 1929, and since this map was prepared, the distribution system of the New Brunswick Electric Power Commission was extended through the lower Saint John valley to Gagetown; from Moncton to Hillsborough, Albert, and Riverside; and to various points off the main transmission line between Musquash and Moncton.

mission and several corporations, notably the Bathurst Company, Limited, and the St. John River Power Company, have investigated a number of sites on which developments have been undertaken or are projected. The information from all sources has been compiled and indicates that the total capacity of present known river sites on the ordinary six months flow basis is about 170,000 horse-power, or possibly about 210,000 horse-power if the two sites on the St. John river at Beechwood and Morrill prove feasible. If figures are included for the great quantities of energy estimated to be available from tidal power sites at Passamaquoddy and Shepody in the bay of Fundy, the estimate of total water-power resources in New Brunswick is in the vicinity of 700,000 horse-power.

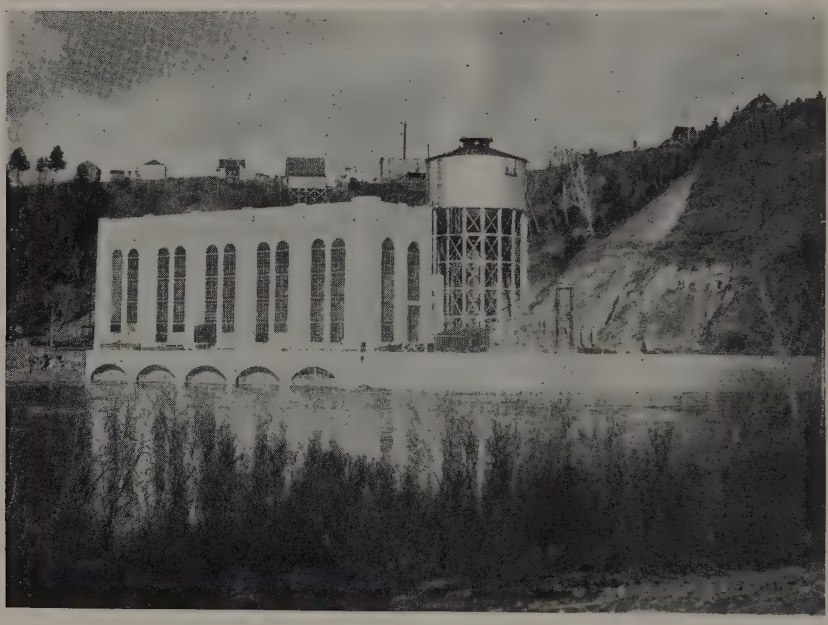
PRINCIPAL DEVELOPED WATER-POWERS AND THEIR UTILIZATION

The total water-power installation in New Brunswick is now 112,131 horse-power, of which 74·8 per cent is installed in central electric stations, 17·2 per cent in pulp and paper mills, and 8 per cent in various miscellaneous industries. A considerable proportion of the central electric station installation develops power which is sold for the manufacture of pulp and paper.

The largest hydraulic development in the province, that of the St. John River Power Company at Grand Falls on the St. John river, is now nearing completion. Of the initial installation of 60,000 horse-power, two units of 20,000 horse-power each are already in place and a third will be installed before the end of 1929. Provision is made for a fourth similar unit to complete the installation to 80,000 horse-power when load conditions warrant.

The output from this plant will be very largely devoted to the pulp and paper industry. The Fraser Companies, Limited, at Edmundston are being supplied with 20,000 horse-power; a certain quantity will be held in reserve for the requirements of the New Brunswick Electric Power Commission, the province of Quebec and the state of Maine; and the remainder of the developed energy will be used in pulp and paper mills under construction by the New Brunswick International Paper Company at Dal-

housie, the power being transmitted on a 132,000-volt transmission line 104 miles in length. Another important application of hydro-electric power to the pulp and paper industry is at Bathurst where 14,000 horse-power is delivered to the mills of the Bathurst Company, Limited, from a generating station at Great Falls on the Nipisiguit river. At St. George on the Magaguadavic river a 4,134 horse-power plant supplies energy to a groundwood pulp mill, while at Edmundston 2,060 horse-power is developed on the Madawaska river for the pulp mill of the Fraser Companies, Limited.



Power House at Grand Falls on the Saint John River

Other outstanding developments in the province are the New Brunswick Electric Power Commission's plant of 11,100 horse-power capacity on the Musquash river serving the cities of Saint John and Moncton and over 50 adjacent small municipalities, and the Maine and New Brunswick Electric Power Company's 11,400 horse-power development on the Aroostook river, which provides energy for distribution in 16 municipalities between Aroostook Junction and Woodstock. Besides these there are a number of

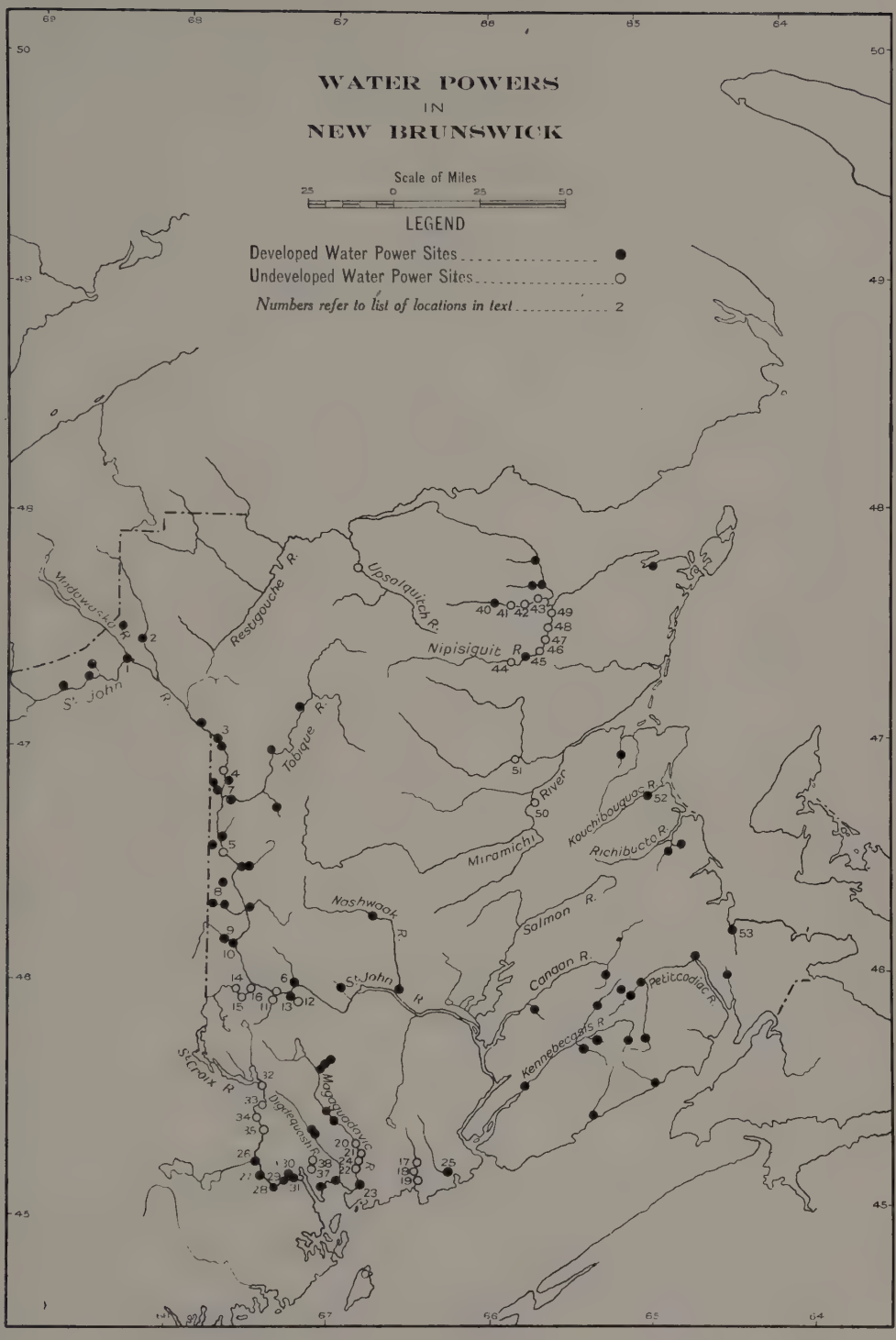
smaller plants such as those of the municipality of Edmundston on the Green river, the municipalities of Richibucto and Rexton on the Kouchibougac, and the Maritime Electric Company, Limited, on the St. Croix river. Near St. Stephen there is a generating station of 3,500 horsepower capacity, which supplies power to operate the cotton mills of the Canadian Cottons, Limited, and from which a small amount of power is sold for distribution in St. Stephen and Milltown.

Aerial View Showing Dam at Grand Falls on the Saint John River

PRINCIPAL UNDEVELOPED WATER-POWERS

The largest undeveloped sites on fresh water rivers are on the St. John river, and on tidal waters at Shepody and Passamaquoddy bays on the bay of Fundy. Many other sites, however, such as those on the Nipisiguit, Magaguadavic, Lepreau, Shogomoc and Pokiok rivers also possess attractive possibilities. The principal water-power resources both developed and undeveloped, excluding those dependent upon the tides of the bay of Fundy, are listed in the following table, but a number of streams on which no information is yet available have not been included.

Two tidal power sites are at present receiving a great deal of attention. The Dexter P. Cooper Company has conducted extensive investigations regarding the Passamaquoddy tidal power project which has a reported capacity of 600,000 horse-power, half of which would be available to New Brunswick; and the Petitcodiac Tidal Power Company proposes to develop 200,000 horse-power at Hopewell Cape in Shepody bay. Including these tidal power sites in the list of available water-powers, the power resources of the province are only about 10 per cent developed.


WATER POWERS
IN
NEW BRUNSWICK
Scale of Miles
25 0 25 50
LEGEND
Developed Water Power Sites
Undeveloped Water Power Sites
Numbers refer to list of locations in text 2
Restigouche R.
Upsalquitch R.
Nipisiguit R.
Tobique R.
River
Miramichi
Kouchibouguac R.
Richibucto R.
Nashwaak R.
Salmon R.
Canaan R.
Petitcodiac R.
Kennebecasis R.
St. John R.
St. Croix R.
Magaguadavic R.
Digdeguash R.
St. John

River and power site	Site Number on map	Head in feet	Horse-power capacity at 80 per cent efficiency			Installed horse-power	Remarks
			At ordinary minimum flow	At ordinary six months flow	Dependable with storage		
Madawaska—							
At Edmundston	1	24	730	1,530	1,660	2,060	Fraser Companies, Ltd.
Green—							
11 miles below Edmundston	2	35	375	1,050	–	700	Municipality of Edmundston.
St. John—							
Grand Falls	3	132	21,800	59,400	60,000	60,000	St. John River Power Co., Ltd.
Morrill[1]	4	–	–	–	20,000–30,000	–	Full information on Morrill and Beechwood sites not yet available, figures approximate.
Beechwood[1]	5	–	–	–	20,000–30,000	–	
Hawkshaw[1]	6	55	18,400	43,600	30,000	–	Investigated by N.B. Electric Power Commission.
Aroostook—							
Aroostook Falls	7	75	3,310	9,000	–	11,400	Maine and New Brunswick Electric Power Co., Ltd.
Presquile—							
Centreville	8	16	36	131	–	320	C. M. Sherwood.
Meduxnekeag—							
3 miles above Woodstock	9	30	169	600	–	–	1,000 h.p. installed but dam destroyed (Woodstock Electric Railway, Light and Power Co.).
At Woodstock	10	13	74	264	–	75	W. J. Miller.
Shogomoc—							
Near mouth	11	264	288	1,030	2,040	–	
Pokiok—							
Above Little Pokiok	12	206	150	561	1,500	–	
Near mouth	13	114	104	373	830	100	Small mill, Pokiok Land and Water Power Co.
Eel—							
3 miles below Benton	14	55	120	435	1,025	–	
2½ miles above Benton	15	80	218	770	1,620	–	
½ mile above mouth	16	80	218	785	1,640	–	
Lepreau—							
Ragged Falls	17	85	193	610	1,270	–	
Big Falls	18	90	229	710	1,350	–	
Lower Falls	19	65	171	505	975	–	
Magaguadavic—							
Long Rips*	20	26	222	830	1,020	–	
Indian Rips	21	35	347	1,300	1,480	–	
Second Falls	22	21	218	815	905	–	
St. George	23	40	495	1,850	1,820	4,134	St. George Pulp and Paper Co.
Red Rock Brook—							
Red Rock Falls	24	170	15	77	139	–	
Musquash—							

West Branch at mouth	25	117	255	800	1,570	11,100	New Brunswick Electric Power Commission.
East Branch at mouth	–	95	199	612	1,240		
St. Croix[2]—							
Grand Falls	26	49	3,880	6,460	–	–	13,650 h.p. installed United States side, St. Croix Paper Co.
Sprague Falls	27	46	3,800	6,360	–	–	14,350 h.p. installed United States side, St. Croix Paper Co.
Baring Dam	28	23	1,920	3,700	–	–	450 h.p. installed United States side, saw and box mills.
Murchie Falls	29	28	2,460	4,120	–	–	700 h.p. installed United States side, Calais and St. Stephen Railway Co.
Salmon Falls	30	22	1,940	3,240	–	3,500	Canadian Cottons, Limited.
Union Dam	31	6–30	528–2,650	883–4,420	–	450	Maritime Electric Co., Ltd.
St. Croix East Branch[2]—							
Shaw Tannery	32	8	214	358	–	–	
Little Falls	33	8	225	374	–	–	
Steep Bank	34	40	1,180	1,960	–	–	
Canoose Rips	35	40	1,230	2,050	–	–	
Eel Lake Brook—							
Grand Manan island	36	225	–	61	61	–	
Goldsmith Brook—							
Bartlett's Falls	37	37	10	30	20	–	
Long Lake Falls	38	75	20	61	41	–	
Upsalquitch—							
Great Falls	39	40	690	1,660	–	–	
Tetagouche—							
Ten miles from Bathurst	40	105	220	420	810	200	
Eight miles from Bathurst	41	132	276	528	1,020	–	
Six miles from Bathurst	42	64·5	135	258	497	–	
Four miles from Bathurst	43	33·5	70	134	259	–	
Nipisiguit—							
Grand Narrows	44	100	1,470	3,570	–	–	
Grand Falls	45	110	1,680	4,060	–	14,000	Bathurst Co., Ltd.
Chain of Rocks	46	35	558	1,350	–	–	
Middle Landing	47	40	662	1,600	–	–	
Pabineau Falls	48	60	1,020	2,460	–	–	
Rough Waters	49	70	1,340	3,250	–	–	
Miramichi—							
White Rapids	50	30	1,830	4,150	–	–	
Little S.W. Branch	51	30	490	1,120	–	–	
Kouchibouguac	52	22	60	200	–	260	Municipality of Richibucto and Rexton.
Scadouc	53	25	23	64	–	100	Plant idle.
Miscellaneous streams with small power developments	–	–	–	–	–	3,807	Total installation.
			68,640[3]	169,127[3]	–	112,131	

[1] Considerable amounts of seasonal power also available from these sites.

[2] The St. Croix river and its East Branch are International boundary streams. The estimates of power at individual sites show the total at each site without division between the two countries.

[3] These totals include only New Brunswick's half share of the estimated power resources of the St. Croix river and its East Branch.

*"Rips" is a colloquialism denoting a short rapid or ripple.

RECREATIONAL RESOURCES

THE energetic development of those assets—in such plenty throughout New Brunswick—which appeal to the hunter and angler, the motorist, the canoeist, and all lovers of forest and stream, is a source of yearly increasing revenue to the province. In 1929 the value of the tourist trade was estimated at $18,000,000; and large though this appears to be, when it is considered that agricultural and forestal products realized only $34,000,000 and $30,000,000 respectively, it is merely a fraction of its potential value. For the present publicity policies of governmental and private organizations have by no means been long in force, and therefore the recreational resources are not as generally appreciated as they no doubt will be.

INCREASING TOURIST TRAVEL

Returns from the federal Department of National Revenue show that the number of Americans visiting New Brunswick for recreation or health—the country is remarkably free from epidemics and affords immunity from hay fever—was 33·7 per cent greater in 1928 than in 1927; 437,730 United States owned automobiles entered the province through one or other of the 23 ports of entry along the international boundary, and of this number 30,670 stayed for periods of more than 24 hours but less than 60 days, and 81 for periods of between 60 days and 6 months. In the first 10 months of 1929 permits issued for stays of between 24 hours and 60 days numbered 35,324, which was 20 per cent greater than in the corresponding period of 1928. The bridge spanning the St. Croix river between Calais, Maine, and St. Stephen, and the route via Richmond Road between Houlton, Maine, and Woodstock are the two main gateways for motorists from New England into New Brunswick and the other Atlantic provinces.

From Montreal New Brunswick can be reached by good roads through the province of Quebec to Rivière du Loup, at which place one has the option of continuing

either by the south shore of the St. Lawrence and along the Matapedia river to Campbellton or by Edmundston. In the province itself 9,500 miles of improved roads,[1] more than 1,400 miles of which are main trunk lines and the balance secondary and by-road feeders, place within the motorist's reach almost all districts except the vast stretch of forest in the centre of the more northerly areas. One of the main highways follows closely the St. John river, which presents many a charming scene to the traveller. At its mouth on the bay of Fundy this river, 450 miles long,

The Reversing Falls on the Saint John River

narrows to 350 feet, hemmed in by limestone cliffs 100 feet high; at low tide a huge volume of water turbulently falls down this narrow passage, but with the rising tide incoming seas oppose and eventually overcome it, and a wall of water, as it were, rushes furiously upwards.

The Canadian National and Canadian Pacific railway systems provide good service both to and within the

[1] See Provincial Government Highway Map; this map and other descriptive publications the tourist needs can be obtained from the Director, Bureau of Information and Tourist Travel, Fredericton, New Brunswick, by whom this section was revised.

province, and their connections with the United States railways place hunting and fishing grounds in New Brunswick less than 20 hours travel from New York.

Regular steamship lines connect Boston, Portland, and other New England ports with Saint John, from which place or St. Andrews the tourist can reach by steamer the many attractive islands in Fundy bay, such as Grand Manan, Campobello, Deer, and the historic St. Croix.

New Brunswick is Famed for Its Many Moose

GAME BIRDS AND ANIMALS

The numbers of moose and deer to the square mile are greater in New Brunswick than in any other part of the American continent. And despite the heavy toll annually taken there has not been any apparent diminution in these numbers in recent years, certain localities showing a decrease, others an increase, which is to be expected in the case of somewhat nomadic animals like deer and moose. Wise legislation and the establishment of game refuges—640 miles thus far, mainly on the Lepreau, Canaan, and

Restigouche rivers, where game and fur-bearing animals, breeding unmolested, serve to restock the surrounding district—have accounted for this satisfactory state.

The hunting season of 1928 was one of the most successful ever experienced from the point of view of trophies taken and of provincial revenue. Game licences (including camp help and guide licenses) realized $50,677.62; deer and moose killed numbered 8,268 and 1,047 respectively, the following table showing the quantities credited to each county. Non-residents shot 511 deer, 162 moose, and 58 bear, the largest moose heads having antler spreads of 61 inches.

	Number of moose killed	Number of deer killed
Restigouche	24	801
Gloucester	51	363
Northumberland	147	1,148
Kent	35	123
Westmorland	77	347
Albert	151	121
St. John	116	63
Charlotte	132	407
Kings	73	341
Queens	101	566
Sunbury	36	229
York	70	1,623
Carleton	14	847
Victoria	12	1,006
Madawaska	8	283
	1,047	8,268

In game birds, too, New Brunswick is abundantly supplied. Along the shores of Chaleur bay and Northumberland strait various species of geese and duck are particularly numerous, the latter being found also on lakes and rivers in nearly all parts of the province. The woodcock is yearly attracting greater numbers of non-residents. Partridges, however, are still under protection, but have been increasing latterly to such an extent that the open season may probably be reinstated in a year or two.

The table below gives the seasons and bag limits for game. A licence[1] to kill both moose and deer is $3 to

[1] Licences as well as all information about game and fishing laws may be obtained from the Department of Lands and Mines, Fredericton, or from vendors in various parts of the province.

residents, $50 to non-residents (the latter may also take two bear under this licence); for deer only, $2 to residents, $25 to non-residents; for bear only, during April, May and June, $25 to non-residents; for birds only, $25 to non-residents.

Game	Open season	Bag limit
Deer	Sept. 15 to Nov. 30	2.
Moose	Oct. 1 to Nov. 30	1 bull (4 years or more and with 10 points or more on antlers).
Bear	April 1 to June 30 Sept. 15 to Nov. 30	2.
Geese, Brant	Sept. 15 to Dec. 31	15 in 1 day.
Ducks, Rails	Sept. 15 to Dec. 31	25 in 1 day.
Coots, Galinules	Sept. 15 to Dec. 31	No limit.
Snipe (Wilson or Jack)	Oct. 1 to Nov. 30	25 in 1 day.
Woodcock	Oct. 1 to Nov. 30	8 in 1 day, but not more than 125 per season.

Since 1905 guides have been registered and licensed by the Government. They are all experienced and reliable, and each year districts, clearly defined, are apportioned

Tourist Cabins on the Tobique River

amongst them in order to prevent parties from conflicting with one another and to ensure safety generally. In 1928 non-resident hunters and fishermen employed 500 guides.

Sporting camps, clubhouses, boys' and girls' camps, fishing and hunting lodges number in all 700, of which many are on Crown camp sites leased from the Department of Lands and Mines, Fredericton, at reasonable rental.

Landing a Salmon on the Restigouche River

FISHING

To the experienced dry-fly angler New Brunswick symbolises Atlantic silver salmon, and indeed there are few places in the world where this kingly fish—so brilliant and vivacious—offers such attractive sport as is obtainable in this province. Of outstanding fame though the salmon rivers are, almost equally excellent in their respective spheres are the fishing waters for trout, land-locked salmon, sea-trout, bass, togue (lake trout), and other varieties. And this asset which the province has in lakes and rivers is still capable of yearly increasing the wealth now secured directly or indirectly therefrom.

In 1928 the disposal of angling privileges netted the provincial treasury $103,135.25, which was $3,600 greater than in 1927 owing to a 36 per cent increase in the licences sold to non-residents. This figure includes the rentals for fishing in the Restigouche, Upsalquitch, Big Sevogle, Tobique, Nipisiguit, Miramichi, Cains, and other rivers. Leases on the Restigouche alone realized $75,000, which is almost five times the amount of a few years ago. A stretch of six miles of this famous salmon river has been reserved

Brood Pond at New Mills for Atlantic Salmon

for the public to fish under club conditions; applications for reservations must be addressed to the Deputy Minister of the Department of Lands and Mines.

The maintenance of the excellent fishing now to be had in many parts of New Brunswick will naturally be contingent upon efforts made to re-stock lakes and streams whenever the supply of trout and salmon shows diminution. Many waters—and especially those nearer the more populated areas—are unfortunately no longer the fishing centres they once were.

The federal Department of Marine and Fisheries has established four hatcheries for Atlantic salmon and speckled trout, two for Atlantic salmon only, and one at Saint John for various species of trout; in addition there are three brood ponds for Atlantic salmon, and one at Florenceville for speckled trout.

The open season for salmon is May 24 to September 30; except in the Restigouche river below Quatawamkedgwick river, April 1 to August 15; in Restigouche river above Quatawamkedgwick river and in Upsalquitch and Quatawamkedgwick rivers, May 1 to August 31; and in tributaries of the St. John river, May 24 to September 15. On certain rivers where the salmon run is early special permits may be granted for surface fly-fishing before May 24. The limit of catch is 30 per week (20 in 4 days in unleased part of Restigouche). The open season for land-locked salmon and trout is April 1 to September 30; not more than 30 speckled or brook trout or more than will together exceed 10 pounds must be taken in one day. There is no close season for bass.

To non-residents (including non-resident leaseholders) a licence for general fishing is $25 a season; for trout and land-locked salmon only, $10 a season; for salmon, land-locked salmon and trout for three consecutive days' fishing, $5. The three-day licence does not apply to the Restigouche, to any leased waters, or to waters within game refuges. The salmon licence for the Restigouche open water is $5 a day to residents, $25 a day to non-residents. In the Lepreau Game Refuge a fishing permit for the season, May 15 to August 31, is $1 to residents, $10 to non-residents.

CANOEING

Sometimes meandering, sometimes rushing past picturesque islands, virgin forest, or fertile valley are countless rivers and streams to meet the holiday demands of the most exacting canoeist no matter what his special inclination. Taking the water at Plaster Rock he may paddle, except for a few portages, up the Tobique to its source and down the Nipisiguit to Bathurst—141 miles in all—across the dense forest of the northerly interior. Or he may change his course at the headwaters of the Tobique and pursue his forested way northwards by the Upsalquitch

and its branches to Matapedia on Chaleur bay. The more adventurous may ascend the Restigouche and by its Wagan tributary reach the St. John river.

He who prefers to be nearer civilization may travel from Grand Falls down the beautiful St. John river 200 miles with but one interruption, a portage to escape the Meductic rapids. Or, detraining at Juniper on the Canadian National railway, 72 miles northwesterly from Fredericton, he can enjoy in his 120 mile paddle to Newcastle down the Southwest Miramichi woodland, open meadow, granite cliffs, and the friendliness of the hamlet occasionally passed.

Bathing Beach on the East Coast

BATHING BEACHES

Reference to the recreational resources would be incomplete unless mention were made of the 600 miles of sea coast with its wonderful bathing beaches and opportunities for deep-sea fishing.

All along Chaleur bay from Campbellton eastward, at Dalhousie, New Mills, Charlo, Jacquet River, Bathurst, and other spots are miles of the finest sand beach sheltered by great groves of pine and spruce. At New Mills is the Bonaventure camp where American and Canadian boys spend their summers under supervision.

On the picturesque east coast are the attractive shores of Miramichi bay and many popular places such as Richibucto, Buctouche, Shediac and Pointe du Chêne. The Northumberland strait is protected from the rigours of the north Atlantic by Prince Edward Island, and the coast of Kent county, therefore, offers many opportunities for visitors from inland cities to enjoy an ideal vacation.

A delightful summer resort is St. Andrews on Passamaquoddy bay, with its two golf courses, magnificent Algonquin hotel and many beautiful summer homes. Another favourite spot on the south coast is St. Martins; in fact the bay of Fundy holds many a charming niche with sandy shore, often little exploited—thereby enhancing the pleasures of a holiday to those seeking a region tranquil and unhurried.

PRODUCTION AND MANUFACTURING

ACCORDING to the Dominion Bureau of Statistics the net value of production in New Brunswick, that is the gross value minus the value of materials consumed in production, was $88,714,359 in 1927, equal to 2·3 per cent of that for the whole Dominion. This figure compares with $90,004,329 in 1926, $87,097,614 in 1925, and $78,298,070 in 1924. The net amounts contributed by the different branches of production during 1927 and 1926 are thus summarized:—

——	1926	1927
Agriculture	32,906,000	29,032,000
Manufactures	30,047,278	29,886,083
Forestry	26,767,453	26,135,977
Fisheries	5,325,478	4,406,673
Construction	2,989,000	5,092,000
Mining	1,811,104	2,148,535
Custom and repair	1,445,000	1,559,000
Electric power	1,399,166	1,503,019
Trapping	234,832	234,832
Grand total	90,004,329	88,714,359

NOTE.—Under "manufactures" have been entered products of dairy factories, saw-mills, pulp mills, fish canning and curing establishments, shipbuilding yards, and certain mineral products, which have already been included under other items; the amounts so duplicated were $12,920,982 and $11,283,760 in the net values of production during 1926 and 1927 respectively, which figures have been excluded from the grand totals.

In 1927 agriculture accounted for 32·7 per cent of the net production-value, forestry for 29·5 per cent, and manufacturing (exclusive of dairy products, etc.; *see* note above) for 21·0 per cent. If the products of dairy factories, etc., are also included among manufactures, manufacturing contributed 33·7 per cent compared with 33·4 per cent in 1926, 32·7 per cent in 1925, and 34·4 per cent in 1924.

Since 1927, which is the latest year for which statistics of manufactures are available, the expansion in pulp and paper making, hydro-electric developments, and in industry generally, has increased both manufacturing values and invested capital by millions of dollars.

The following table gives the ten leading industries in 1927:—

—	Establishments	Capital	Employees	Cost of materials	Value of products
	No.	$	No.	$	$
Saw-mills	233	20,555,201	5,243	7,669,731	11,835,035
Pulp and paper	5	18,322,185	1,344	4,224,382	8,934,580
Cotton yarn and cloth	4	5,762,992	1,953	1,911,805	4,505,046
Coffee and spices	5	2,112,170	136	2,443,848	2,833,026
Biscuits, confectionery, etc	8	2,269,655	672	1,302,769	2,531,796
Fish curing and packing	172	1,626,776	2,146	1,406,896	2,221,241
Electric light and power	42	10,420,005	285	426,609	1,929,628
Butter and cheese	38	795,239	190	1,174,443	1,683,065
Flour and grist mills	33	297,176	65	1,510,825	1,679,490
Boots and shoes, leather	5	1,109,778	521	921,042	1,676,591
Grand total, all industries, 1927	872	99,087,327	18,970	42,780,582	72,666,665

NOTE.—The Dominion Bureau of Statistics does not publish figures regarding any industry if there are fewer than 3 establishments in such industry; this explains why there is no reference to the sugar refining industry at Saint John, the statistics concerning which and other industries are included in the grand total.

Segregating New Brunswick's manufacturing establishments in 1927 into recognized groups:—

——	Establishments	Capital	Cost of materials	Value of products
	No.	$	$	$
Wood and paper products	352	42,940,932	13,318,560	24,535,814
Vegetable products	113	17,366,047	17,615,596	23,687,790
Animal products	240	4,684,318	4,992,131	7,424,890
Textile products	39	7,380,430	2,711,487	6,288,531
Iron and its products	26	6,962,367	2,348,763	5,573,732
Electric light and power	42	10,420,005	426,609	1,929,628
Chemicals and allied products	8	794,194	623,901	953,169
Non-metallic mineral products	43	7,204,301	224,816	882,880
Non-ferrous metal products	3	655,543	149,646	709,978
Miscellaneous industries	6	679,190	369,073	680,253
	872	99,087,327	42,780,582	72,666,665

LEADING INDUSTRIAL CENTRES

In the following table are given principal statistics regarding industrial plants in cities and towns during 1927. The value of the products in the urban centres listed was 77·79 per cent of the province's total output-value of manufactures:—

—	Establishments	Capital	Employees	Cost of materials	Value of products
	No.	$	No.	$	$
Saint John	129	33,487,639	3,494	18,632,862	28,060,757
Moncton	40	7,633,891	2,359	3,680,229	7,350,483
Edmundston	10	6,708,529	437	1,864,022	3,760,024
Bathurst	14	8,311,565	594	1,305,264	3,360,292
St. Stephen	16	2,427,710	520	1,473,294	2,614,753
Fredericton	31	3,331,028	705	1,214,491	2,428,377
Milltown	3	2,329,538	863	688,927	1,806,947
Newcastle	16	3,349,394	545	1,204,136	1,706,695
Sackville	11	1,520,730	410	441,819	1,093,101
Campbellton	16	2,370,571	325	549,635	1,017,957
Chatham	12	2,537,264	245	446,933	920,268
Sussex	14	413,006	170	429,026	807,159
Grand Falls	11	377,335	169	290,744	449,894
Dalhousie	3	767,830	114	281,696	400,530
Woodstock	17	420,908	114	79,796	272,229
St. George	4	532,263	81	65,853	208,964
Port Elgin	6	156,527	98	84,642	160,200
Hartland	3	172,590	42	77,060	108,031

Saint John is outstandingly the leading industrial city of the province, being a nationally operated gateway on the Atlantic, and directly connected with the Canadian Pacific and Canadian National railways. Its splendidly sheltered harbour is never affected by ice and is accessible at all tides. Twenty ocean steamship companies and fifteen coastwise lines operate from it, the commodities exported in large quantity being grain and flour, lumber and newsprint, general merchandise, potatoes, fuel oil, automobiles, pulpwood, bunker coal, and refined sugar, whilst leading imports, also from a tonnage point of view, are raw sugar, coal (anthracite and bituminous), general merchandise, gasoline, fertilizer, and Indian corn; grain and flour shipments in 1928 totalled 809,700 tons, and imports of raw sugar 101,572 tons.

The port has low and high water depths of 32 and 60 feet at the principal piers, and its equipment includes 16

Aerial View of the Harbour at Saint John

The Dry Dock at Saint John

ocean berths; about 500,000 superficial feet of warehouse space; cold storage plants; frost-proof warehouses for potatoes and perishable goods; live stock depot; warehouse for storing fertilizer; oil and coal bunkering facilities; dry dock (1,150 feet long) and ship repair plant within harbour limits; and railway trackage to accommodate more than 4,000 cars. Furthermore, extensive improvements are under way involving an initial expenditure of $5,000,000, which was voted in the federal session 1927-28.

What in trade economics is termed invisible assets is an item of great importance to any country having steamship services to all parts of the world. In the case of New Brunswick an invisible asset not to be overlooked is the value accruing to the province from the shipping trade which centres in Saint John, including part of the profits of the export and import houses, shipping companies and banks accommodated there, and a steady income from the yearly ebb and flow of passengers.

PORT OF SAINT JOHN—CUSTOMS RETURN

INCOMING VESSELS

—	Transatlantic					Coastwise	
				In ballast			
	Number of vessels	Tons register	Tons freight	Number of vessels	Tons register	Number of vessels	Tons register
1925-26	464	1,044,742	529,209	394	366,208	1,732	396,342
1926-27	448	1,053,473	507,584	684	461,723	1,813	440,056
1927-28	509	1,097,731	437,152	459	237,747	1,803	382,548

OUTGOING VESSELS

1925-26	604	1,111,389	860,143	162	103,447	1,779	577,716
1926-27	749	1,404,972	1,204,974	206	112,104	1,976	616,641
1927-28	594	1,004,897	972,409	239	66,571	1,950	662,300

Among Saint John's industries are a sugar refinery; brush factory; brass and copper plating works for valves and similar products; lumber, woodworking (including cooperage), and pulp mills; wire and sheet metal works; foundries; a pottery; meat packing; lime kilns; tool factory; biscuits and confectionery making; beverage works and brewery; textile plants making cotton yarns, cloth, knitted goods.

Sugar Refinery at Saint John

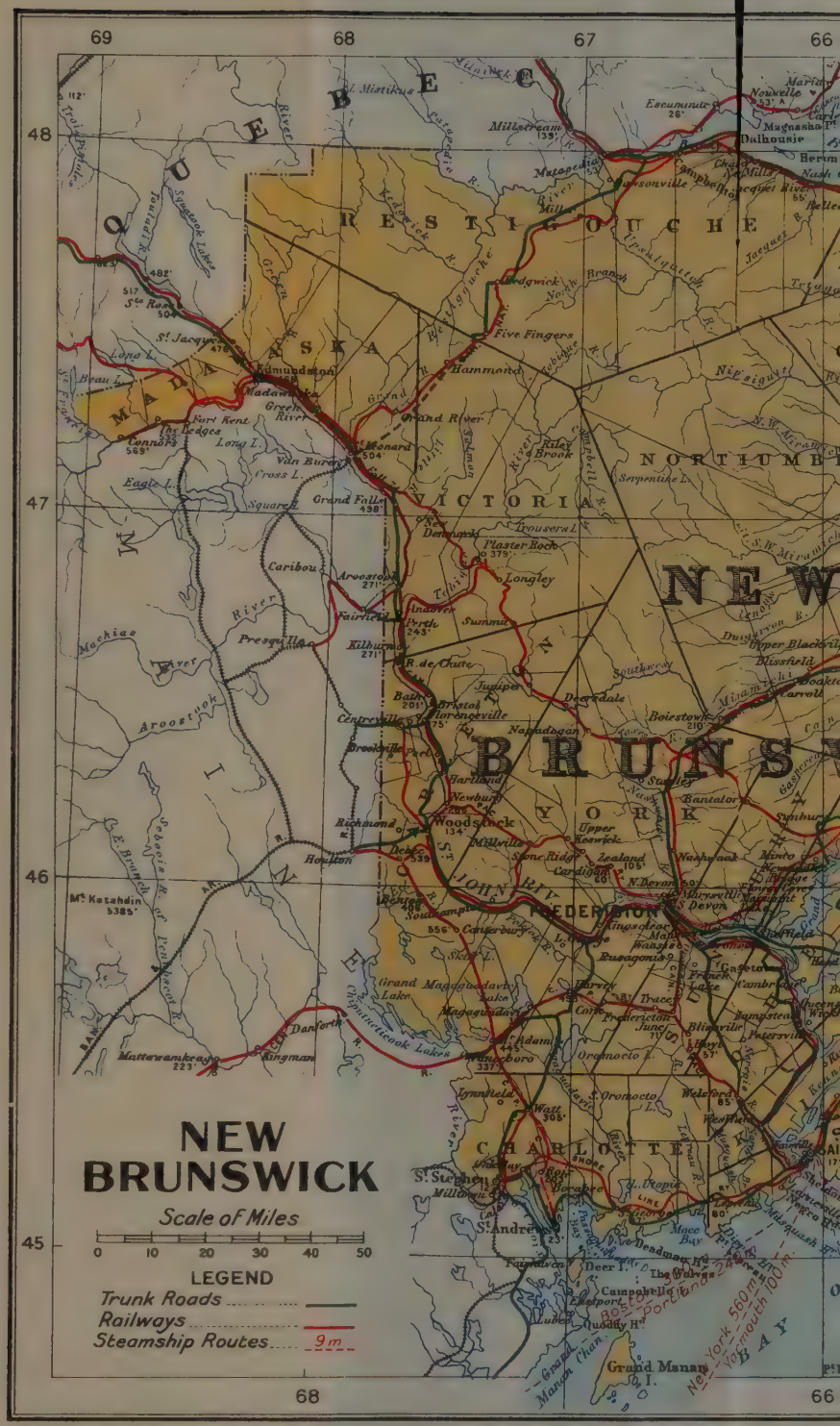
The Bore on the Petitcodiac River

Moncton the second largest city, is an important railway divisional centre and its growth has been further aided by cheap light and power from the natural gas of the nearby Stoney Creek field. The city's industries include, in addition to the large workshops of the Canadian National Railways, lumber and planing mills, hosiery and knit goods plants; meat packing; a biscuit and confectionery factory; foundries; the making of stoves and furnaces, auto-tops, beverages, barrels, wire fences and other wire goods. A centre of attraction to tourists is the "Bore", a wall of

One of Two Large Plants at Fredericton Making Oil-tanned Footgear

water three to six feet high—according to the season—which advances up the Petitcodiac river at the head of the tide from the bay of Fundy transferring what previously was a mere sluggish stream into a mighty restless river capable of floating large vessels.

Bathurst, Chatham, Edmundston, Campbellton (a divisional point on the Canadian National railway) and Newcastle derive much of their industrial importance from lumber mills or phases of pulp and paper making, or both,


NEW BRUNSWICK
Scale of Miles
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LEGEND
Trunk Roads
Railways
Steamship Routes
9 m
69
68
67
66
48
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46
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QUEBEC
RESTIGOUCHE
MADAWASKA
VICTORIA
NORTHUMB
NEW
BRUNS
YORK
CHARLOTTE
KING
Edmundston
Grand Falls
Woodstock
Fredericton
St. Stephen
St. Andrews
Grand Manan I.
Campobello I.
Deer I.
Mt. Katahdin 5385'
Matawamkeag
Kingman
Dantorth
Houlton
Caribou
Presque Isle
Van Buren
Madawaska
Edmundston
Five Fingers
Hammond
Grand River
Millstream
Escuminac
Dalhousie
Nouvelle
Matapedia
Campbellton
Jacquet River
Upsalquitch
Restigouche
Kedgwick
Long L.
Eagle L.
Cross L.
Serpentine L.
Trousers L.
Plaster Rock
Longley
Juniper
Boiestown
Nashwaak
Stanley
Bantalor
Upper Keswick
Zealand
Cardigan
N. Devon
Devon
Lingerock
Maugerville
Oromocto
Oromocto L.
Watt
Tracy
Jemseg
Gagetown
Cambridge
Waterborough
Canterbury
Debec
Richmond
Newburg
Harvey
Harvey Station
Dorchester
Moncton
Shediac
Sackville
Amherst
Point de Bute
Baie Verte
Cape Tormentine
Port Elgin
Sackville
Memramcook
Petitcodiac
Hillsborough
Albert
Alma
Riverside
Fundy National Park
Hopewell Cape
Moncton
Shediac
Cape Tormentine
Baie Verte

48
47
4

and all except Edmundston are connected in some way or other with sea fisheries. In conjunction with lumber operations, Newcastle has a wood-creosoting plant to which reference has already been made.

Fredericton (so named in 1785 in honour of the second son of George III) is the provincial capital and seat of the University of New Brunswick. Picturesquely situated where formerly stood the French village of St. Anne, it is

The Factory at Fredericton Where Canvas-covered Canoes are Made in Large Quantity

one of the much frequented detraining points for hunters and fishermen. Its principal manufactures are boots and shoes, oil-tanned leather and larrigans, canoes, rough and planed lumber, cooperage, bricks and tiles, and foundry products.

St. Stephen makes chocolate and confectionery, soap, ladies' shoes, wood products, axes and tools; at Milltown close by is a textile factory for ginghams, denims, and other cotton goods.

Sackville, the home of the Mount Allison educational institutions, manufactures stoves and furnaces, paper boxes, and harness. Near by are pursued lumbering, farming, small fruit growing and the raising of silver foxes, and between Sackville and Amherst are cut yearly 40,000 tons of hay from the Tantramar dyked lands.

Cotton Mill at Marysville

WEALTH OF NEW BRUNSWICK

THE Dominion Bureau of Statistics estimated by the so-called "inventory" method[1] that the capital wealth of New Brunswick was $751,818,000 in 1927 compared with $597,596,369 in 1921, the corresponding figures for the Dominion as a whole being $27,687,596,000 and $22,195,-000,000 respectively. The figures for the two years are not exactly comparable, however, in view of certain improvements and additions that have been made in the method of computing the capital wealth since 1921.

The following table compares the wealth of New Brunswick in 1927 with that of the other Maritime Provinces:—

—	Wealth	Per cent of Canada's wealth	Population, June 1, 1927	Per cent of Canada's population	Wealth per capita
	$				$
New Brunswick.....	751,818,000	2·71	411,000	4·32	1,829
Nova Scotia.....	857,129,000	3·10	543,000	5·70	1,578
Prince Edward Island.....	148,493,000	0·53	86,700	0·91	1,713

The items making up the figure of $751,818,000—shown above as representing the wealth of New Brunswick in 1927—are given below. All duplication has been avoided, the item "fisheries," for example, including capital invested in primary operations, but not that in fish canning and curing establishments; the latter is recorded under manufactures notwithstanding that it might also be considered as part of the wealth connected with the fisheries. Similarly, the items "manufactures" exclude investments in lands and buildings in urban centres; these are entered under "urban real property," which is made up of assessed valuations of taxed and exempted property increased by one-third in order to provide for under-valuation by assessors,

[1]This method consists in totalling the amounts known to be invested in agriculture, manufacturing, dwellings, etc.; undeveloped natural resources are not taken into account, except in the case of forest wealth in which is included an estimate of the value of accessible raw materials. Statistics of this nature must not be considered strictly accurate, for the concept of wealth is decidedly intangible and numerous elements of uncertainty arise in computation.

96710—11½

and for roads, bridges, and sewers. "Forests" include the estimated value of accessible raw materials and of the young growth in 1927 together with the capital invested in woods operations. In regard to specie holdings New Brunswick has been credited with an amount which bears to the total, viz., $257,328,000, for all Canada the same ratio that the population of New Brunswick bears to that of the Dominion.

Farm values (land, buildings, implements, machinery and livestock)	$ 140,534,000
Agricultural products in possession of farmers and traders	34,307,000
Total agricultural wealth	$ 174,841,000
Mines (capital employed)	3,014,614
Forests (estimated value of accessible raw materials plus investment in woods operations)	121,577,000
Fisheries (investment in boats, gear, etc., in primary operations	3,900,212
Central electric stations (investment in equipment, materials, etc.)	5,390,000
Manufactures (machinery and tools plus estimate for investment in rural lands and buildings; duplication excluded)	34,470,000
Manufactures (materials on hand and stocks in process)	19,555,000
Construction, custom and repair (estimate of investment in machinery, tools, and materials on hand)	1,961,000
Trading establishments (estimate of value of furniture, fixtures, delivery equipment, and materials on hand)	31,858,000
Steam railways (investment in road and equipment)	142,000,000
Electric railways (investment in road and equipment)	3,089,750
Canals (amount expended on construction to Mar. 31, 1928)	44,388
Telephones (cost of property and equipment)	4,495,000
Urban real property (assessed valuations of taxed and exempted property plus estimate for under-valuation by assessors and for roads, sewers, etc.)	109,656,000
Shipping (estimated from 1918 census)	2,575,000
Imported merchandise in store (taken as one-half imports during 1927)	13,430,000
Automobiles (estimate of value of those registered)	16,840,000
Household furnishings, clothing, etc. (estimated from production and trade statistics)	52,000,000
Specie, coin, and other currency held by government, chartered banks, and the general public	11,121,000
Total	$ 751,817,964

FINANCE AND TAXATION

AS a result of the transfer in 1929 of the St. John and Quebec Railway to the Canadian National Railways, the province was relieved of debenture obligations to the amount of $6,000,000 and of the yearly deficit of about $250,000 on its operation—which was an annual charge against the ordinary provincial revenue.

The financial statement given below takes cognizance of these facts as well as the September, 1929, issue of $2,720,000 of 5 per cent thirty year debentures which were sold at 5·15 per cent interest cost to the province, and the purposes of which were the provision of $1,470,000 for permanent roads, $800,000 for permanent bridges, and $450,000 for university and hospital buildings.

Debenture debt		$ 41,468,202
Short term loans for capital expenditure		4,745,000
		$ 46,213,202
Less:—		
St. John and Quebec Railway debentures	$ 6,000,000	
Revenue producing debt, hydro-electric power plant	3,800,000	
Cash held for future capital expenditure	597,312	
Cash deposited with Dominion Government	529,299	
Sinking funds	3,551,293	
Other credits	150,000	
		14,627,904
Net provincial debt		$ 31,585,298
Indirect liabilities, fully secured		1,267,000
Crown timber lands		50,000,000
Public buildings		2,000,000
Annual subsidy from Dominion Government		1,240,300
Provincial revenue for 1928		5,786,667
Provincial expenditure for 1928		5,588,458
Estimated assessable property within province		200,000,000

The expenditure of $5,588,458 in 1928 was largely in connection with public debt interest; public works; education; interest on bonds issued for road construction; forest

service; the provincial hospital; and agriculture; while the leading sources of revenue ($5,786,667) were federal subsidies and allowances, stumpage receipts, motor vehicle fees, succession duties, incorporated companies' taxes, gasoline tax, the Liquor Control Board's profits, the provincial hospital, fish and game licenses, and renewals of timber licences.

Municipalities raise their money by direct taxation. Each has its assessor, whose duties are to prepare an annual statement showing all lands within the boundaries of the municipality together with the owners' names; to set a valuation on these lands and on the buildings and improvements thereon; and to prepare a roll of the adult inhabitants of the municipality showing the value of personal property and the amount of income of each. A tax is then levied to meet the estimated requirements of the ensuing year. These taxes are for roads and bridges, schools, general administration, water and sewage systems, and for the acquisition and operation of public utilities. The total provincial and municipal taxation compares favourably with that in any other section of North America.

The Natural Resources Intelligence Service of the Department of the Interior, Ottawa, supplies without charge information on the resources of Canada and their industrial development. It publishes numerous reports and maps which, it is hoped, will help those making use of the Service.

Inquiries for further information about New Brunswick or any other part of the Dominion will be referred to the proper governmental authorities.

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